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UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

Reserve

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CHATS WITH THE WEATHER MAN. RELEASE Friday, January 9, 1931.

ANNOUNCEMENT: Now for another chat with the weather man. Our old friend, Ob. Server, has been to the United States Weather Bureau, has talked with the scientists there, and is now going to tell us a few things between the lines of our daily weather forecast ---- Well, Mr. Ob. Server? ----

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You read the daily weather forecast at a glance. Or you hear it in a brief moment at the radio.

It is a short, simple statement of what we may expect in the way of weather.

It may just say "Fair and warmer" or "Slightly-colder" as the case may be. But Mr. I. R. Tannehill, of the Forecast Division of the United States Weather Bureau, says that even such simple statements are often misinterpreted, because a lot of people don't understand when it is to be.

Those are not mere vague generalities, as some seem to think. If the forecast says "colder" or "warmer", it refers to a very definite time of the day. "Colder" means for instance that the temperature tomorrow evening at 8 o'clock sharp, Eastern Standard Time, will be lower than at 8 o'clock tonight.

And you will probably read that in your paper or hear it by radio this afternoon, say. In other words, in making that prediction the forecaster really forecasts two temperatures; what it will be at 8 o'clock tonight and roughly what the difference will be between that temperature and the temperature at eight o'clock tomorrow night.

Forecasts are made twice a day. The forecast which ordinarily appears in the afternoon papers is based on a map drawn from observations taken in the morning. The forecast in the morning papers is that made from the observations taken at eight o'clock Eastern Standard Time, the night before. The morning forecast is for 36 hours in advance. The night forecast is for 48 hours in advance.

I say "Eastern Standard Time" because that is the Washington time. The observations are taken at practically the same moment in all parts of the country; but, of course, when it is 8 o'clock Eastern Standard Time, it is just 7 o'clock Central Time; and so on across the country.

On the Pacific Coast that means observations are taken about five o'clock in the morning. They have been taken, and charted, and the forcast made, and issued before most folks in the far west are out of bed in the morning.

It takes less than two hours from the time observers in all parts of the country read the instruments at their local stations until the forecast is made and issued from each of the five district forecast centers for each and every one of the States in the Union. In the eastern part of the country, where the observation time is 8 o'clock, that makes it 9:30 to 10:00 o'clock before the morning forecast is issued.

When you consider what's done in that less than two hours, Mr. Tannehill reminds me, you realize that is considerable of a feat. Our weather men are fast workers.

Maybe you will sit down with your newspaper this evening in a comfortable heated room. You will probably throw a glance, as most people do, to the top of the sheet, just to see what the weather will be tomorrow. You most likely won't even think of how the information was collected on which that forecast is based.

I'll admit that until Mr. Tannehill told me about it, I didn't realize that to get one scrap of that information, our westernmost observer, on far-away St. Paul's island in the bleak Bering Sea, got up at 1'o'clock this morning to make his observations. Those records were flashed through Alaska by radio, and put on the telegraph lines at Seattle and sent to the forecast centers throughout the country.

Yes, observations are taken in Hawaii, too. But if you will get your map out, you will find that little island in the Bering Sea is even further west than Hawaii.

And while these messages were coming from balmy Hawaii and Alaska and beyond, observations made at all the other stations scattered throughout this country were also being filed and flashed by telegraph to the district centers. Similar information was also coming from Canada and Mexico.

Those records were entered on a map -- just like one of those weather maps you've all seen. That was done this very morning, and every other morning, at the five district forecast centers, at Washington, New Orleans, Chicago, Denver, and San Francisco.

Then at each of those centers, a forecaster stepped up to the map of charted weather reports. For a few moments, he focused his years of experience and weather knowledge, on that map. Then he made his forecast, which was flashed out over the entire territory by radio and telegraph. And you picked it up by radio or in the paper.

The Washington forecaster made the prediction for all the States bordering the Atlantic and the States of Tennessee, Kentucky, Ohio, and West Virginia as well. The Chicago forecaster made the prediction for the western Lake States, and the upper Mississippi Valley and the Great Plains area. The New Orleans forecaster took care of the Southern plains and Gulf States. The Denver man foretold the condition for the Rocky Mountain Region, while the San Francisco center forecast for the Pacific Coast States.

But you may have noticed that the forecast you heard or read was for your State alone. Mr. Tannehill tells me that now, although the forecasts are actually made at five district forecast centers, a separate forecast is made for each and every State.

I say "now" because up until the first day of this New Year, forecasts in New England were made just for northern New England and southern New England. Beginning January 1, there have been separate forecasts made for Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

Each of the other States was already getting a separate forecast. In fact, in some of the large States, where conditions warrant it, two separate forecasts are made for different sections of the State. New York, Pennsylvania, and Texas have separate forecasts made for their eastern and western parts.

From what Mr. Tannehill tells me, the United States Weather Bureau is constantly working to get more and more observations from a wider and wider territory on which to make more and more accurate the weather forecasts issued twice a day, for each State in the Union. And just think that whole continent-wide collection of reports and distribution of forecasts is all done in about two hours time.

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ANNOUNCEMENT: Two weeks from today, our old Ob. Server will be back with another of his chats with the weather man. Station _____ presents this feature in cooperation with the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

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★ FEB 1 1931 ★
U. S. Department of Agriculture

CHATS WITH THE WEATHER MAN. Friday, February 20, 1931.

ANNOUNCEMENT: And now for another chat with the weather man at the United States Weather Bureau. Every other Friday, our old friend, Mr. Server tells us about weather --- Often it is about the new developments in forecasting ---- What's up, this time, Mr. Observer?-------

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I guess you heard that the first of this month, the new air route forecasts went into effect for the entire country.

Mr. W. R. Gregg, chief of the aerological division of the United States Weather Bureau, tells me that new system was tried out in an experimental way on the Pacific Coast during the past year. It proved so satisfactory, that now it has been extended to the entire net-work of national airways.

The forecasts are being made from our five regular forecast centers located at Washington, Chicago, New Orleans, Denver, and San Francisco.

The Washington center forecasts for the eastern air-lanes; for example, for the Washington to New York route, and for the Cleveland to New York airway, and the Atlanta to Evansville, just to mention three of the routes.

The Chicago office makes these air forecasts for such routes as those from Chicago to Cleveland, and Chicago to the Twin Cities, and Chicago to Kansas City.

New Orleans takes care of the forecasting for the line from New Orleans to Sanantone, the one from Atlanta to New Orleans, and the one from Dallas to Brownsville.

Denver has just two routes on its lines as yet, that from Salt Lake City to Cheyenne, and the one from Salt Lake City to Great Falls, Montana.

San Francisco, of course, covers such routes as the one from Frisco to Medford, Oregon, the one from San Francisco to Los Angeles, and the one from Los Angeles to Amarillo, Texas.

Definite forecasts are made for each airway or section of airway covering a period of twelve hours after they are issued; that is from ten in the morning to ten at night in the western states or from noon to midnight from the eastern forecast centers.

You see that's a much shorter period than the regular daily State forecasts which are for 24 to 36 hours in advance. The shorter period forecasts can be more detailed and more definite. These airway forecasts also emphasize certain elements not in the general weather forecast.

Of course, they give the general weather. But they also give indications of upper air movements, or winds that pilots may expect to find aloft. And probably most important of all, they give some idea as to the visibility.

As you know, we've had weather forecasts at the principal airports for some time. They were based on the general weather reports sent out from the forecast centers.

The purpose of this new system of route forecasts from the chief Weather Bureau centers, Mr. Gregg tells me, is to enable the Weather Bureau officers at the various airport stations to issue the shorter period forecasts with more accuracy and detail than has been possible heretofore.

These route forecasts are distributed to the different stations along the airways by means of the Department of Commerce's teletype system and the Department of Commerce's radio broadcasting network. There are about 7,000 miles of airways served by the teletype system. As you know, in that system, the message is just written as on a typewriter and is instantaneously and automatically written out on other similar machines at the receiving end.

In a few cases, the forecasts are sent by telegraph, but in a short time, Mr. Gregg says, the newer system will be used for those also.

Well, that gets us the general air route weather forecast to the main airport weather stations. That gives the Weather Bureau officers stationed at those ports the basic information they need for the shorter period or trip forecasts. Those trip forecasts are issued for periods of three hours ahead. Or, in this weather business, the shorter the period, as a rule, the more accurate and detailed the forecast can be made. In addition to the route forecasts, the trip forecaster has supplemental reports received along the airways in between, and also gets reports from pilots as they come in of the conditions they have passed through on the way. Fog, low clouds and thunderstorms, and conditions favoring the formation of ice on the plane while in flight are the four chief dangers the Weather Bureau airway forecasters must watch out for in order to give timely warnings.

At the more important stations, the chief of the aerological division says, the Weather Bureau furnishes a 24 hour forecasting service.

Then at selected points along the airway in between the principal stations, there are observers who take observations and report the conditions and instrument readings, but are not authorized to make forecasts.

The observations are made by means of instrumental apparatus, including ceiling balloons for measuring the height of the clouds in the day time, and the so-called ceiling light for observing at night.

As you may know, the ceiling light is just a beam of light which is projected on a cloud at night at a known distance from the observation point. The light is sighted through a portable tube instrument by means of which the observer can read the angle of the light, and use it in calculating the height of the cloud. ------ And by the way, that little instrument known as a clinometer was invented by Dr. Marvin, the chief of the Weather Bureau.

Clouds, of course, are highly important in the life of an aviator and his passenger; especially if those clouds are not high. In mountainous regions, Mr. Gregg says, the height of clouds becomes especially important for passenger planes, because Department of Commerce regulations do not permit such planes to take off if the clouds are less than 500 feet high.

Well, this airways weather system with its new devices for measuring upper air conditions, its radio and teletype communication, and all its other interesting features is a facinating subject. I'm tempted to go on, but I've already given you a brief sketch of the newest of our old reliable Weather Bureau progressive services as outlined to me by the chief of the Bureau's aerological division.

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ANNOUNCEMENT: You have just heard a short description of the new air route weather forecasts as told by Mr. W. R. Gregg, chief of the aerological division of the United States Weather Bureau. This is one of the regular "Chats with the Weather Man" broadcast once every two weeks by this Station in cooperation with the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

★ MAR 3 1931 ★
U. S. Department of Agriculture

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CHATS WITH THE WEATHER MAN Friday, March 7, 1931.

ANNOUNCEMENT: And now for our chat with the weather man. Our old friend, Ob. Server, has again been to the United States Weather Bureau, and again learned some of the important new developments in weather science. ---- This time it is the plans for that great adventure of science, the Second Polar Year.

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This is not only a weather talk, but a radio talk, and an aviation talk.

As you know, the North and South polar regions are the biggest, among the most important blind-spots on our weather map. Those shimmering Northern Lights and Southern Lights are also believed to be closely connected with the same electrical and magnetic phenomena which may have something to do with radio transmission. And the future development of aviation across the Arctic Ocean, as a short-cut to the old World, depends a lot on conditions in the upper-air in those regions.

Mr. E. B. Calvert, chief of the forecast division of the United States Weather Bureau, has been telling me about the plans being worked out by a committee of the International Meteorological Organization to get a complete picture of North and South Polar weather and magnetic and electrical phenomena during the course of an entire year. It is the most ambitious polar investigation undertaken in the last fifty years. Mr. Calvert, who has been our country's representative in a number of recent arrangements for cooperation in weather work with other nations, calls it "a great adventure in science."

For hundreds of years, there has been a glamor of romance and adventure about Arctic and Antarctic exploration; for any cause, at any time. Most of us thrill when any little group of explorers pit their powers against Nature in the polar wastes.

But this plan for a systematic day-by-day check on polar conditions for a year seems awesome in its vastness. Instead of one expedition by one nation, there will be many expeditions by many nations. Practically every country holding lands fronting on the polar seas is expected to take some part. Many will send out parties to set up these weather and magnetic outposts. A number of the parties will consist of only three men.

Later all the observations made by all the stations and expeditions which will rim the two poles will be collected and mapped. With these musketeers of science, it is "All for one, and one for all," so the

scientists of the world may know the year around changes in conditions in all parts of the Arctic and Antarctic.

August 1932 to August 1933 has been proposed as the "Polar Year," during which these observations will be made. Those dates have been selected because they mark the fiftieth anniversary of the First Polar year.

Back in 1875, Lieut. Karl Weypecht, of the Austrian Navy, launched a plan for the first such charting of polar conditions, and twelve nations, including the United States, made the observations during the year extending from August 1882 to August 1883. At that time, there were fourteen expeditions in the field, twelve in the Arctic and two in the Antarctic.

Two very famous Arctic expeditions of the United States were part of our participation in that First Polar Year. On the western side of our continent, we had the famous Point Barrow expedition under Lieut. P. H. Ray, who set out in September 1881 with 9 men and remained at Point Barrow for two years, where he made an expensive record of weather observations every day during the polar year period. The other expedition was that of Gen'l (then Lieut) A. W. Greeley in the Baffin Bay region on the eastern side of the continent, remarkable in the history of Arctic exploration for the hardships encountered. He started out in 1881 with 23 men, nearly all of whom were dead before the final heroic rescue by Admiral Schley in 1884.

Partly in celebration of the work of the First Polar Year and partly because of the convenience of the fifty-year period for a re-check on conditions, it is planned to have the Second Polar Year begin in August of next year.

This time, however, Mr. Calvert says, it won't be necessary for the United States to send out an expedition. We already have three or four weather stations within the Arctic Circle which report surface weather conditions twice every day by radio. We also have two aerological stations in western Alaska where observations in the upper air are being made by means of pilot balloons.

Mr. Calvert thinks it likely that we will take additional upper air-observations during the Second Polar Year at the Point Barrow station which is nearly the northermost point of our territory.

You see, radio and aviation have developed since that First Polar Year and upper air observations have taken on an importance undreamed of fifty years ago. In the plans for the Second Polar Year therefore, the upper-air observations will play a prominent part.

The height of the clouds and the direction and velocity of the winds aloft can be readily calculated by releasing small balloons and watching their flight with instruments on the ground.

Temperature and other measurements of the upper air are often obtained in this and other countries by sending up self-recording instruments in free balloons. But on the rough ice of the lonely polar regions, such a method is impractical due to the difficulty in recovering the instruments and records.

However, the director of the Danish meteorological service, who is chairman of the committee in charge of the plans for the Second Polar Year, has pointed out that most of the existing weather stations in the Arctic are located in sheltered fiords where the cold air settles, and do not give a true picture of the temperature of the free-moving air of the polar regions in general. To overcome that difficulty, he proposes the establishment of high-level stations in mountainous parts of the Arctic.

The plans call for two such high-level stations on the west coast of Greenland, two on the east coast of Greenland, two in Iceland, one in the Faroe islands, others in Norway, or Spitzbergen, and probably other parts of the Arctic. These positions would be occupied by larger parties and more complete equipment that the expeditions equipped to make surface and pilot-balloon upper-air observation.

In the South Polar region, it is planned to have most of the stations located on sub-Antarctic islands rather than on the Antarctic continent itself. The island stations will be supplemented by observation parties on board whalers and other ships in the Antarctic Ocean.

All the details of the observation of the Second Polar Year have not been worked out yet, Mr. Calvert says, but Canada, Norway, Sweden, Holland, Russia, Germany, England, the United States, Argentina, and some other nations are expected to take part. Observations in the Arctic and Antarctic will also be supplemented by similar observations taken at special stations in the tropics, as well as those from the regular stations throughout the world.

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ANNOUNCEMENT: You have just heard a brief sketch of the plans for the observation of the Second Polar Year, as the golden jubilee of the famous First Polar Year. These chats with the weather man are presented once every two weeks by Station_____ in cooperation with the United States Department of Agriculture.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

★ MAR 23 1931 ★

U. S. Department of Agriculture

CHATS WITH THE WEATHER MAN. Friday, March 20, 1931.

ANNOUNCEMENT: And now for a chat with the weather man. Every two weeks, our old Ob. Server goes to the meteorologists of the United States Weather Bureau for fresh weather news. This time, he goes to the ends of the earth with them in the search for cold facts about this ever changeable subject.

******

Now that Spring is just around the corner, we feel more comfortable in chatting about the cold of Arctic and Antarctic nights.

For that is just what I've been talking to Mr. William C. Haines, of the United States Weather Bureau, about. Mr. Haines, was the meteorologist on both the Byrd North Pole Expedition and the Byrd South Pole Expedition.

Of course, up in this half of the globe, we think of Arctic weather as being the last and lowest word in coolness. But take it from Mr. Haines, who has been both places, the Arctic can't hold a candle-light to the Antarctic for "winter and rough weather."

And speaking of candle-light, it was so cold in the Antarctic that the kerosene in an ordinary kerosene lantern froze. It wouldn't rise in the wick, and the light went out. It was so cold at times, that you could blow out your breath against the wind and hear it freeze as it passed your ears. Mr. Haines says the sound was a sort of swishing noise like that of snow blowing over a frozen drift.

However, he never heard his breath freeze that way except when the thermometer registered 60 degrees below zero or lower. You see, the low-down cold stories are not mere explorers tales for temperate-climate consumption. Mr. Haines kept the record of the weather. There in "Little America" at the edge of the barrier ice of the lofty Antarctic continent, he had a complete Weather Bureau station. He made all the measurements made in a first-class Weather Bureau station in this country, over a continuous period of 14 months. In addition to the temperature, and pressure, and cloudiness, and wind direction and velocity obtained by the ordinary station, he made 400 soundings of the upper air by means of pilot balloons.

He tells me that in the middle of July it was 72 degrees below zero Fahrenheit. And for three days in July it was down to 70 degrees below zero.

But that's not hinting that it was colder than in January. Remember, the seasons in the Southern Hemisphere are just the reverse of ours. July was the coldest month for the year averaging 45 degrees below zero and September ran a close second averaging 44 degrees below. May, June, and July are the months of the long winter night in the Antarctic. Mr. Haines and

the other members of the Byrd Expedition saw the sun go down in April, and the next time they saw it was in the latter part of August.

As long as the sun was above the horizon in the warmer months of November to February and merely swung around in the sky, there were definite daily changes in temperature in reference to the noon-time position of the sun as with us.

The temperature even in the comparatively warm mid-summer months of December and January fell below zero at times, and this would be what most of us would call bitter cold. Mr. Haines says the temperatures in the Antarctic sometimes fluctuate widely, and in a surprisingly short time.

Northerly winds down there bring warm weather, and in the Antarctic night, Mr. Haines found his thermometer recording a rise of temperature from -9 degrees below zero to 16 above in less than twenty hours. That is, a jump of 65 degrees.

I started to say a jump of the mercury of 65 degrees, but alcohol thermometers were used. Mercury thermometers couldn't be used at any such temperatures. Mercury freezes at 38 below zero. Mr. Haines tells me that mercury froze like a chunk of lead down there. He threw some out on the snow, and it froze instantly like molten lead dropped on a floor.

Those sharp rises in temperature usually come with the blizzards, the most dreaded weather menace in Antarctica. The blizzards come every week or so. Mr. Haines recorded 37 honest-to-goodness blizzards during the year, not to mention many more which might be classed as blizzards by folks who have never seen the genuine article as displayed in the Antarctic.

When the wind gets up to about 20 miles an hour it begins to pick up the drifted snow and adds it to what is falling. With a thirty mile wind, it is unsafe to get away from camp. You can't see more than a few feet ahead. There's little chance to get back.

You know the great British explorer, Scott met death in the Antarctic when he was tramped for days by a blizzard when only a few miles from plenty of food and fuel.

There was less fog in Little America than in Spitzbergen where Mr. Haines was stationed during the Byrd North Pole flight. However, Mr. Haines says it is remarkable at what low temperatures moisture particles can stay liquid in the air, as he has observed dense fog in the Antarctic at temperatures considerably below zero.

But the reasons for that are still under investigation, and Mr. Haines may have something more to say about that later, and also about those peculiar rings around the sun and other optical phenomena found so conspiciously at the ends of the earth.

Besides, the weather measurements made at the Station, other measurements were taken by other members of the party in their exploration of the interior of the continent.

This "Little America" station, you understand, was just on the edge of the vast Antarctic continent, considerably larger than the entire United States, and all ice covered except the higher mountains, some of which rise bare to heights of nearly three miles above sea level.

Yet this ice-clad continent, Mr. Haines says, must have once enjoyed a more genial climate for geologists of the expedition found evidence of coal formations which must have been laid down when thick vegetation covered these frozen and as yet largely unexplored regions, containing the largest blind spots still left on the world's weather maps.

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ANNOUNCEMENT: You have just heard a brief outline of weather conditions at the ends of the earth, as described by Mr. Wm. C. Haines, meteorologist with the Byrd Expedition. Two weeks from today we will have another little chat with the weather man on some other feature of our ever-changing weather. This feature is presented by Station ----- in cooperation with the United States Department of Agriculture..

UNITED STATES DEPARTMENT OF AGRICULTURE — Radio Service — OFFICE OF INFORMATION

CHATS WITH THE WEATHER MAN — Friday, May 29, 1931.

NOT FOR PUBLICATION

Speaking Time: 10 Minutes.

ANNOUNCEMENT: Now let's have a chat with the weather man. Old Ob. Server has been to the United States Weather Bureau to find out what is stirring besides the wind. You remember a couple of weeks ago, he was telling us about our upper-air work. Since then he has inquired about how our system of upper-air observation along our airways compares with the weather services along European airways ------Well, Mr. Ob. Server? ———

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Mr. W. R. Gregg, chief of our United States Weather Bureau's aerological division, just got back from Europe.

He went over there as our representative to the Madrid meeting of the International Commission for the Exploration of the Upper Air, and in order to study what some of the European weather services are doing for aeronautics.

You see our Weather Bureau keeps up on what is going on. If any other nation works out any better ways of observing or forecasting the weather we want to know about them.

Mr. Gregg flew nearly everywhere he went in Europe; to France, Germany, Holland, and England. He tells me passenger airplane service is in general more developed in Europe than it is in this country. Of course, we have a few airlines, such as the line between New York and Washington, with its hourly service both ways, which does a passenger business even bigger than any of those in Europe. But in the interior of the country, our airplane passenger service is not nearly so highly developed as in Europe. On the other hand, air mail flying is much more developed in this country than in Europe. It is chiefly the mail between different countries that is carried by plane in Europe. The mail within those smaller countries can be handled promptly by train.

Mr. Gregg says the weather services for air routes in France, and Germany, and England, although they have grown up independently, are very much like our own; even to the point of having commissioned forecasters at the larger ports and non-commissioned observers at the smaller intermediate landing fields; and to taking observations not only at the air stations, but at points located at some distance to either side of the air route.

In Germany, pilots are required to consult the weather forecasters before taking off; and in France and England they usually do talk things

over with the weather men, but they do not have to. The weather forecasters in all these countries carefully refrain from giving pilots any advice as to whether a flight should be made. The weather men just give the facts and indications as to what weather will be encountered. Decision as to whether or not the flight shall be made rests with air service officials.

General weather forecasts for the airways in these European countries are made from observations taken four times a day, instead of twice a day as in this country.

In France, the Paris office is the headquarters for weather service to all aviation interests both civil and military. Forecasts for the various flying routes are made at Paris. The forecasts, together with the 4 times a day synoptic reports and pilot balloon observations made at several points in France five times a day, and airplane observations made at one place, when the weather is good, are sent to Le Bourget field by special leased wire.

The reports are entered on the usual small scale maps and posted where pilots and others can consult them. In addition to that, every half hour during the day reports are received by radio from the bigger terminal airports like Croydon, England, and Cologne, Germany. Regular telephone and telegraph reports are received from selected points on the airways, and those intermediate stations send special reports during bad weather or on call from Le Bourget. Those reports are all posted on a very large scale map, and another large scale map is used to show the upper winds at the various pilot balloon stations.

Each State or Province of Germany has a separate and distinct weather service for the general public needs, but the weather service for aviation is under one head for all Germany. The central office is in Berlin, but the weather service for aviation is given at the airports of which there are 16 main ones with meteorologists in charge. Nine of those airports have radio stations and local reports are broadcast every half hour.

In addition to the regular weather stations, the German service for aviation maintains 25 pilot balloon stations and 5 airplane stations to get the upper-air observations.

Mr. Gregg went from Germany to England by way of Holland and in flying over the channel was in fog for forty minutes. In that connection he told me about the system they have over there of directing planes not only to fly to the right of a given line, as is done by radio in this country, but of notifying each plane at what levels to fly so as to avoid collisions in the air. When air travel gets thicker, we'll have to have some such system as that.

In spite of the fog we hear so much about, there are very few cancellations of trips from Croydon, England to the Continent on account of weather. Planes fly on regular schedule 95 per cent of the time.

At Croydon, pilot balloons observations are made four times a day. The balloons used are much like those used in this country, and the lanterns

for night observations, Mr. Gregg says, are almost exactly like those used here.

Speaking of upper-air observations, however, that Madrid meeting Mr. Gregg attended went on record as urging further development of pilot balloon investigations at sea, and more use of airplanes in upper air investigations by all countries.

One of the big jobs of that meeting, however, was to lay plans for the upper air work of the Second Polar Year, which is to be observed next year. From what Mr. Gregg tells me, that will be the most complete exploration of the weather conditions in the upper air ever undertaken. Of course, you know, the main idea is to get a more complete yeararound record of weather in Arctic and Antarctic regions, the biggest blind spots in our daily weather maps. But that investigation includes more than just the polar weather. Upper-air observations will be made at stations located all over the world on the same days each month, so as to get a practically complete picture of the interchange of air between the tropics and the poles. The different nations will not only make simultaneous observations from their regular upper-air stations; but additional stations will be set up on high mountains and special pilot balloon investigations will be undertaken at a number of new points, both on land and sea. In fact, it looks as if next year may mark the coming into its own of world-wide weather observation in three dimensions.

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ANNOUNCEMENT: You have just had a small ear-full of upper-air weather, in a chat from Mr. W. R. Gregg, chief of the aerological division of the United States Weather Bureau. We will have another chat with the weather man two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

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1.9 In3 Chat

CHATS WITH THE WEATHER MAN

RELEASE Friday, June 12, 1931.

NOT FOR PUBLICATION

SPEAKING TIME: 10 Minutes

ANNOUNCEMENT: Well, we are going to have a few cooling thoughts on the weather now. Your old Ob. Server has been to the United States Weather Bureau for a chat with the weather man, and it seems that they went deep into some cool subjects ---- Well, Mr. Observer? ----

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How many thunderstorms do we have here in a year? How long do they last? How deep does the frost go into the ground in this locality? What is the deepest it ever has gone?

Those are some of the questions which come to the United States Weather Bureau.

And those are not idle inquiries from "Ask-me-another" fans. Dr. Oliver L. Fassig, chief of the climatological division of the Bureau, tells me a power company wanted to know about those thunderstorms. In planning operations in a new locality, that company needed to know how many hours of thunderstorms it would have.

Builders of many kinds, of course, are interested in knowing how deep the frost penetrates. In laying pipes and foundations and the like, such information is essential. In fact, Dr. Fassig says that the rapid extension of road building projects throughout the country has brought so many requests from engineers and contractors about the frost line in various sections of the country that the Chief of the Weather Bureau took steps to find out how deep the frosts go in all parts of the United States.

True, in many localities, there is generally somebody who has a pretty good idea as to just how far down the frost goes. In some places, actual records have been kept over a number of years. However, if a contractor in one section undertakes a job in strange territory, he is often at a loss to find anybody who can tell him what he needs to know about the frost line.

Heretofore, there has been no way engineers and others could get this information accurately and promptly in many localities. Now, however, the Weather Bureau has made a systematic survey of the depth of frost from one end of the country to the other.

Right now, I have before me printed Weather Bureau charts prepared under the direction of Dr. Fassig and showing how deep the frost penetrates, on the average, in each State in the Union. Also another chart showing the deepest frost goes at hundreds of localities scattered from Ocean to Ocean and from the Canadian border to the Gulf.

But Dr. Fassig has done more than just map the frost line. He has worked out a rough general rule, by which anybody can tell about how deep the frost may be expected to go in any section of the country.

That is getting a little ahead of our story, however. To get the needed information was no small job. It was obtained through the Bureau's extensive organization of Section Directors, hundreds of regular weather observers, and its more than 5,000 cooperative observers. But in most cases, the weather men didn't have the information themselves. They just looked up the men who knew. The actual frost figures came from engineers and others. And, of course, the reliability of the replies varied a great deal.

Some of the most accurate replies, Dr. Fassig says, came from grave-diggers. Like Hamlet's grave-digger many of these men had followed their lugubrious calling in the same locality for thirty years or more. Working every day with pick and shovel the depth of the frost line seems to have been pretty well impressed on their minds and muscles.

Well, the Weather Bureau got more than 1300 replies covering every State. Dr. Fassig entered these estimates on the map of the country and connected up the points of equal depth by lines. As you would expect, those lines check up with the records of average winter temperature.

The chart as finally worked out shows that the zero line of no frost and the line of average winter temperature of 55 degrees extending through northern Florida follow our southern limits and the Pacific Coast to northern California.

Starting at this no frost line near the Gulf and going North, the frost penetrates deeper and deeper. Along the line from the Canadian border in Minnesota and North Dakota, where we have our coldest average winter temperatures, of 5 degrees, the frost penetrates fifty inches into the ground.

Or if you start at the no frost line in California near the Oregon boundary and go northeast toward northern Minnesota you find a similar difference. When you measure the distances on the map from the no-frost line in the South to the deepest frost line in the North, and from the no-frost line on the Pacific Coast east to the deepest frost line, you find they are about the same length, some 1250 miles.

What's more, the increase from points where the frost doesn't go into the ground at all to the points where it goes into the ground to a depth of fifty inches is at a fairly steady rate.

Dr. Fassig reduces his data to this simple rule: The rate of <u>increase</u> in the depth of the frost line is roughly one inch for every 25 miles from the Gulf northward and from the Pacific Coast toward northern Minnesota. That is, for every 25 miles north you go from the Gulf, you can generally count on the frost going one inch deeper into the ground. And the same for every 25 miles east from the California-Oregon boundary to northern Minnesota.

And also for each 25 miles north or east, as the case may be, the average temperature gets one degree colder. Right there, engineers and builders all over the country have a rough general guide for their calculations. Of course, local variations have to be checked up in the locality itself, but that is the rough rule.

Well, you say, but that frost one inch further down for each 25 miles north is the average. Engineers can't count on frost going no deeper than the average.

But Dr. Fassig has mapped the records and estimates of the greatest depths to which frost has been opened in the various parts of the country. Roughly, they are about twice the average.

However, this survey, Dr. Fassig, tells me is merely the first attempt to get the information which is of great value to a constantly increasing number of interests. There are records of Agricultural Experiment Stations, and other scientific measurements scattered here, there, and yonder, which it is hoped to compile and chart so as to give an even more detailed and accurate picture of frost conditions.

So you see, the United States Weather Bureau is almost literally digging up facts about our climate.

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ANNOUNCEMENT: You have just heard about the frost penetration survey, as outlined by Dr. Oliver L. Fassig, chief of the climatological division of the United States Weather Bureau. This is one of the chats with the weather man presented by Station _____ in cooperation with the United States Department of Agriculture. We will have another of these chats two weeks from today.

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UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN

RELEASE Friday, June 26, 1931

NOT FOR PUBLICATION

Speaking Time: 10 Minutes.

ANNOUNCEMENT: Now let's hear from our old friend, Ob. Server. You know, Station ---- in cooperation with the United States Department of Agriculture, presents his "Chats with the Weather Man". He talks with the specialists of the United States Weather Bureau and then passes on the good word to us ---- Well, Mr. Ob. Server? ----

****

I guess you all heard about that train that was blown off the track.

That was one of those things that do happen. As you recall, the crack "Empire Builder" express from Seattle to Chicago was breezing along through Minnesota at about sixty miles an hour when it ran head-on into a tornado swirling along at close to the same rate.

Well, that crack storm blew the goggles off the engineer. It also lifted six steel coaches off the track. One of those steel cars was set down 80 feet from the track. One man seems to have been blown out the window and killed when the train fell on him.

Prof. A. J. Henry, meterological editor of the United States Weather Bureau, tells me that is the only case on record where a twister has actually lifted a train off the track. It is not often twisters and trains cross paths on the same schedule, or meet on the same road.

But he was showing me a report of that same tornado by one of the observers of the United States Weather Bureau who followed the trail of damage and interviewed some of the people who had a passing acquaintance with that particular storm. And that tornado did a lot of other queer things besides blowing that train off the track.

Of course, you know, a tornado is one of the most local storms we have. The path is usually not very wide. Sometimes not more than 40 to 50 feet wide. From that on up to a mile or more. Prof. Henry says the average width is about 1,000 feet, but many are only 500 to 600 feet across. And the length of the path is short. On the average, the tornado peters out after going about 25 miles. However, some tear on their course of destruction for 200 miles or more.

Even the most local tornado seldom escapes the watchful eyes of the Weather Bureau. With its more than 5,000 observers scattered throughout the United States, it is almost bound to hear of any tornado that occurs.

You understand, the tornado is that fiercest of all storms commonly called a "cyclone" and even more familiarly termed a "twister". Prof. Henry says "cyclone" is a perfectly good word used by all weather experts every day to describe the regular wide-spread "low pressure" general storm area. For that reason, meterologists prefer that we refer to these more occasional, violent storms, with their typical funnel-shaped clouds and terrifically spiraling winds, as tornadoes. ----

But I started to tell you about that train-wrecking tornado, and some of the other things it did.

A farmer was standing in the door of his barn when that same tornado passed his place. He was actually watching it as its snout-like funnel of clouds swept by apparently about 200 yards from where he stood. Then ----

Then the barn arose and left him.

One side of that barn was found on the north side of the farm-house. Another side was found on the south side of the farm-house. Another on the east. But the farm house was undamaged. The top of the barn had been carried up and over some trees fifty feet high. And the man who had stood in the doorway was left in his tracks unharmed. ---- Just another of the many freak things that happen near the path of a tornado.

At other points along its path chickens were found stripped of all their feathers, but running around naked and unhurt. Straws were driven like nails into the bark of trees. In fact, said Prof. Henry, it would take many volumes to hold all the seemingly marvelous but well-attested stories of bizarre tornado damage.

Most of these miraculous happenings seem to take place on the edges of the twister.

Unfortunately, not all are as lucky as that farmer who had his barn leave him. Seldom, if ever, does anybody caught in the direct path of the tornado live to tell the tale. The tornado path is a path of death and destruction.

As a rule, a tornado moves along across the landscape at a rate of 25 to 40 miles an hour, just medium auto tourist travel. But the swirling vortex of winds which make up this storm, move at a terrific velocity of tremendous destructive power, while there is updraft of air inside the funnel of swirling winds which moves at a rate of 100 to 200 miles, judging by the way it carries up timbers and other heavy objects.

Prof. Henry points out that there are a lot of things about tornadoes we don't know. It is impossible to predict just where and when these storms will strike, or to forecast their path except in a very general sort of way.

Nobody has made a close-up study of a tornado and lived to tell the tale.

Just what the conditions are which produce these intensive storms and their sharply defined paths are uncertain. They seem to originate high in the air.

Of course, you know the United States Weather Bureau has for many years made upper-air observations by means of kites and sounding balloons carrying recording instruments. But such records are scanty, and only a very few of those, of course, have ever been made near one of these very local storms very close to the time when the storm started. So you see, our meteorologists don't yet know just what the conditions are aloft which cause the formation of the tornado with its wiggling finger of cloud and wind which reaches down and blots out houses and people in its path.

Of course, they have accurate records of conditions on the ground, before, after, and during the passage of the twister. In a general way, it might be possible to say when conditions seem ripe for the appearance of a tornado somewhere in a wide area. But such forecasts, Prof. Henry says, would serve no useful purpose. They would create much unnecessary alarm over a wide area, and be of no practical value to any of those people who might be along the narrow unknown path which the twister would take.

However, the scientists of the United States Weather Bureau continue to grope for every new fact which may help solve the secrets of that terribly destructive force we call the tornado.

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ANNOUNCEMENT: You just heard the Chat with the Weather Man. Before we breeze along to something else, let me say that old Ob. Server will be back with us two weeks from today with another of these talks which Station ---- presents in cooperation with the United States Department of Agriculture.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

CHATS WITH THE WEATHER MAN. RELEASE Friday, July 11, 1931.

ANNOUNCEMENT: Let's have a chat with the weather man now. As usual, our old Ob. Server has been to the specialists of the United States Weather Bureau to find out some of the workings of some of the many services of that organization --- Well, Mr. Ob. Server, what's in the wind today? ----

****

As you have noticed recently, this is the open season for nerve-racking airplane hop-skip-and-jumps across the ocean and around the world.

The United States Weather Bureau doesn't lend its approval to such dangerous undertakings. But if flyers insist on going, Principal Meterological Forecaster O. L. Mitchell tells me, the Weather Bureau does give its services to help make the trip a success.

Of course, the weather men never advise any air pilots when to take off. They just supply the weather facts and forecast. It is up to the common sense and experience of the aviators how they act on those facts. But when they reach the other side and tell about the weather they encountered on the way over it is a twice-told tale. They usually find the weather as the Weather Bureau predicted they would find it before they left.

You understand, of course, our Weather Bureau makes a forecast of flying weather for the Atlantic hoppers only to mid-Atlantic.

When the flyers, say at New York ready to take off, ask for this over-sea flying weather service, they generally apply to the local Weather Bureau office. This local office notifies the headquarters at Washington. From the daily reports from weather observers at regular surface stations, airway upper-air stations, and radio reports from ships at sea, the forecaster at Washington makes a forecast of weather along the proposed route of flight for the next twenty-four hours half way across the Atlantic.

In addition, the British Meterological Service is requested to send its forecast for weather conditions on the eastern half of route. The London office forwards this forecast by radio from London, England, to Washington. The Washington office forwards its own forecast and the London forecast to the local Weather Bureau Station, where a local weather expert turns it over to the waiting aviators. The meterologist on the ground acts as a contact man for the Washington forecast headquarters. He delivers the forecast and talks it over with the pilots.

In one of these flights from this side eastward across the Atlantic, the main weather aid, is the forecast from our own Weather Bureau. The British Meterological Service forecasters predict flying weather conditions only 24

hours ahead, just like our United States Weather Bureau forecasters. You must remember, London time is five hours ahead of our Eastern time. So by the time flyers on this side get half way across the ocean to where the London forecast applies, the period for which that forecast was made has about run out.

In making up forecasts for these flights, Mr. Mitchell tells me, the main reliance of the forecaster is the Weather Bureau's chart of the Northern Hemisphere weather conditions made up from reports, literally, from "Greenland's icy mountains to India's coral strands."

Into this chart also go the reports from vessels plying the ship lanes and even others off the main travel routes across the ocean. These reports are sent in daily by radio from ships in the western half of the Atlantic to Washington while those on the eastern side report to London.

Mr. Mitchell was showing me on the maps, how the number of these ship reports, which are the main reliance for reports of conditions at sea, have increased until now there is no considerable area in the North Atlantic from which we do not get reports nearly every day. Those reports, of course, show weather conditions practically at the surface. To make forecasts of upper air weather for trans-Atlantic flyers, the forecaster has to interpret the surface conditions at sea in the light of the relationship of surface and upper-air conditions on land.

In doing that, he makes use of the net-work of upper-air observations taken at weather stations along our airways and at other selected points. Those observations are made with pilot balloons and show the direction and velocity of the wind at different levels. Ten years ago, we didn't have enough of those stations to be of much practical value. Since then the number of stations has been increased so that today there are enough stations distributed throughout the country to give a fairly complete picture of the weather aloft. Our meterologists can now map the movements of winds across the country at the different levels.

Merely knowing the direction and speed of the wind is not enough. It is highly important to know whether it is hot or cold, dry or moist. If the wind is from a certain direction, whether it will bring clouds or showers depends on how much moisture is in it. Mr. Mitchell says that during some of the worst hot waves of Washington, D. C., the wind comes from the northwest. But those hot winds don't come from Canada and Alaska. What has happened in those cases, is that hot air from our Southwest moving northward has met pressure conditions which forced it to curve back toward the southeast.

For many years, we have had a few kite stations to send up instruments in kites to get temperature and moisture conditions aloft, and now we are inaugurating a more reliable airplane service to get those measurements at different levels above a few places.

In that work, Mr. Mitchell says, we have lagged behind England, and France, and Holland, and especially Germany. We don't need these upper-air temperature and moisture stations as thickly located as the pilot balloon stations for getting the direction and speed of the wind, but Mr. Mitchell hopes that some day we will have at least some twelve to sixteen airplane stations.

He figures that about four spaced across the country from North to South would probably be enough in the East; with a like number in the Middle-West, West and Far West, to give the meterologist the needed measurements to trace the movements of hot and cold air masses from one part of the country to another and from one level to another.

Upper-air weather observation is still in its infancy. It is so new that nobody knows just what its potentialities are. However, it seems pretty clear that pilot balloons and the airplane are doing much to lift weather science into the third dimension, and give our forecasters more solid facts with which to work.

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ANNOUNCEMENT: You have just listened to a chat with the weather man, presented by Station _____in cooperation with the United States Department of Agriculture. We will have another of these chats two weeks from today.

UNITED STATES
DEPARTMENT
OF AGRICULTURE

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★ JUL 14 1931 ★
U. S. Department of Agriculture

Receive

TO PROGRAM MANAGERS:

The "Chats With the Weather Man" release dated for Friday, July 11, should have been dated Friday, July 10. Please observe the Friday release day, as usual.

Very truly yours,

Morse Salisbury

Morse Salisbury
Chief of Radio Service.

UNITED STATES DEPARTMENT OF AGRICULTURE
Radio Service
OFFICE OF INFORMATION

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CHATS WITH THE WEATHER MAN. Friday, July 24, 1931.

ANNOUNCEMENT: And now let's have a chat with the weather man. As usual at this time, our old friend, Ob Server, will tell us more about the work of the United States Weather Bureau in keeping up with the weather, or a jump or two ahead of it ----- Well, Mr. Ob. Server? ------

---

Mr. E. B. Calvert, chief of the forecast division of the United States Weather Bureau, has been telling me that the radio has become our chief means of getting weather warnings to farmers.

That used to be one of the big problems of the Weather Bureau; how to get weather news to the farmers. When the rural mail service was established, that helped. But until recent years, the most direct and successful way of getting weather information into the country has been our rural telephone systems.

In the past ten years, however, radio has taken a steadily increasing part. We now have about 300 broadcasting stations cooperating with the Weather Bureau. All parts of the United States are within the ranges of those stations. Each of them broadcast the daily weather forecasts at least once a day. Every agricultural community, however remote it may be from ordinary communication facilities is now on equal terms with populous centers in obtaining weather forecasts and warnings, thanks to radio.

And thanks also to the Weather Bureau officials having been quick to see the possibilities of radio for weather forecasting. A few months after Marconi, in March 1899, sent his first wireless message across the English Channel, our Weather Bureau began to investigate the possibilities of applying the new means of communication to its work.

But getting out the regular daily weather forecast is only one of the many phases of the work of the Weather Bureau. Of course, that is what you might call the back-bone of the weather service. Incidentally, Mr. Calvert says, that a careful comparison of the forecasts with the weather for the periods covered by those forecasts shows that they are right between 85 and 90 per cent of the time.

He makes that statement in a little pamphlet just issued which describes the work of the Weather Bureau in all its phases. Of course, we joke with the forecasters about his misses in those ten to fifteen per cent of the cases, but honestly we have to admit that 90 per cent hits is pretty good shooting.

As Mr. Calvert points out in his booklet, which is U. S. Department of Agriculture Miscellaneous Publication No. 114, it is essential that farmers, stock raisers, and all other folks interested in the important problem of supplying the Nation with food keep close contact with prevailing weather conditions and their effect on farming operation, the growth of crops in different sections of the country, and the condition of the range in our great western grazing areas.

The Weather Bureau maintains special weather and crop services, just to get that information. It has two services, a daily service and a weekly. A large number of special crop weather stations are maintained throughout the chief cotton and grain producing sections. Every day reports are received from those special station and bulletins are published containing that information at 53 central stations in different parts of the country.

The weekly service consists in the publication of that well-known weekly weather and crop bulletin issued every Wednesday at Washington. There is also a local weather and crop summary published at each State center which gives the information more in detail as to conditions in that State. Then there is a bulletin for the cotton region published at New Orleans and another for the corn and wheat region published at Chicago. The information used to make up those bulletins comes from a large number of cooperative weather observers and weather and crop correspondents covering practically every county in these United States.

In addition a weekly cattle-region bulletin is published at several central points in the western grazing country. When we mention the western range country, we are taking in a lot of territory. Some sections may be suffering from a severe drought while others may have plenty of moisture and enough feed for livestock and some to spare. In such cases, it sometimes becomes necessary to ship stock from unfavorable to more favorable regions, so it is important that livestock men know the weather and range conditions in all parts of the area. Again, bankers and others who lend money to livestock raisers need such information.

Another of the numerous Weather Bureau services Mr. Calvert mentions in his booklet is the fire-weather warning service by which the Bureau helps the Forest Service and owners of timber lands and forestry associations protect our great forests of California, Oregon, Montana, and Idaho, and Minnesota, Wisconsin, Michigan, the New England States and the Adirondack and southern Appalachian regions. Numerous weather substations have been established in our forests and observers report by telegraph to district centers and their reports of conditions are used to prepare fire-weather forecasts and warnings. These warnings sent to forest supervisors and rangers enable them to make advance arrangements for putting out any fires that may start.

Then there is the river and flood service, with its 66 district centers and about 900 substations, located along our principal rivers to give warnings of floods and forecasts of river stages which are useful not only in case of danger from floods but for navigation and other interests in times of low water.

Fishermen in the Columbia River district claim, Mr. Calvert says, that the water stage has an effect on the entrance of salmon from the ocean. By watching the river forecasts they can predict a spurt in the run of salmon with a fair degree of accuracy.

When some rivers get low many water-power plants have their supply cut off. With ample notice from the river forecasts they get their auxiliary steam plants ready for use and so keep going without interruption.

In this talk I can't begin to mention all the different uses or even all the distinct services described by Mr. Calvert in that little Miscellaneous Publication No. 114. All in all, to run the regular Weather Bureau observation stations outside of Washington takes more than 1,000 employees. But the numerous offices of the bureau throughout the country are always open during business hours, and the public is cordially invited to visit them and avail itself of the information to be had there.

As Mr. Calvert says, the Weather Bureau is maintained and conducted in the interest of all the people, and the chief of the bureau earnestly desires that the greatest possible use be made of the very large amount of weather information collected by the bureau during the 60 years of its existence, and that the widest possible distribution be given to the daily weather forecasts and warnings.

That little Miscellaneous Publication No. 114 will give you some insight in the many and varied phases of the work, and the thousand and one uses to which the regular and special forecasts are put. Miscellaneous Publication No. 114 besides describing more fully the few services we have mentioned, also tells about the weather maps and bulletins, about the marine meterological service, the ship weather reports, the mountain snowfall measurements, frost and fruit warnings services, the aerological service, and about the instrument used in recording weather changes.

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ANNOUNCEMENT: Miscellaneous Publication No. 114 can be had either by writing to this Station _____or by writing direct to the United States Department of Agriculture, at Washington, D. C. It is free as long as the supply lasts.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION

AUG 1 1931

U. S. Department of Agriculture

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CHAT WITH THE WEATHER MAN. RELEASE Friday, August 7, 1931

NOT FOR PUBLICATION

Speaking Time: 10 Minutes

ANNOUNCEMENT: In our chat with the weather man today, we are going to hear something of how the United States Weather Bureau and the men who "go down to the sea in ships" work together for their mutual benefit ------ Well, Mr. Ob Server, let's go! ---

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Mr. L. E. Brotzman told me a rather striking story about two American sister ships and a storm at sea. I am going to pass that story on to you, because it is a fine illustration of one of the newest of our weather services.

Mr. Brotzman, by the way, is the meterologist who has been engaged in the "ship visiting" work of the United States Weather Bureau at New York in the interest of our part in the international ocean weather service. Mr. Brotzman is now being sent to New Orleans in the further development of that work.

As you know, our Weather Bureau has for many years had the hearty cooperation of seaman of all nationalities and in every part of the globe. Every year it gets reports from more than a thousand ships scattered through the seven seas. Sailors on those vessels make daily observations and forward them to Washington by mail. Those reports are highly valuable for purposes of record and study.

Several years ago, the United States Weather Bureau established another marine weather service by which ships in nearby waters cooperating with the Bureau make observations and forward them by radio. These messages in code are consolidated with those from other ships and from selected land stations, are rebroadcast and picked up by ships at sea. From that information, it is possible for ship's officers to chart weather conditions along our coast and to a considerable distance out to sea. Those who cooperate with the Weather Bureau are supplied with base maps for making such charts. That service is highly valuable, not only to ships, but to the Weather Bureau in preparing forecasts, especially in tracing the approach of West Indian hurricanes during the hurricane season.

Two or three years ago, Mr. E. B. Calvert, chief of the Forecast Division, of the United States Weather Bureau and representatives of leading European weather services met at Copenhagen and worked out a plan for international cooperation in such a service extending all the way across the ocean.

Under that plan, each nation was to select a certain number of ships, to cooperate in this work. The number selected by each nation was to be a certain percent of the ships under its flag. An international weather code made up of numbers was adopted so that reports would be equally understandable by all nations. Ships plying the shipping lanes of the North Atlantic were all to forward observations by radio to Washington when they were in the western Atlantic and to a European station when they were east of that line. Those reports are made up into one message and rebroadcast to ships at sea for their use. In other words, reports from the different selected ships along the different travel routes are consolidated and rebroadcast for the benefit of all.

But let's get along to that story of how this thing works. Mr. Brotzman tells me work under the international arrangement was actually started about two years ago. Thirty American ships have already been assigned to this selected ship program in the North Atlantic. These are new ships not included on the other two lists of ships cooperating with the Weather Bureau.

And practically every time one of these ships comes into port at New York a representative of the Weather Bureau visits it just to sort of keep in touch with the ship's officers and the weather reporting work and explain how to make weather maps to any new men on the job.

You understand, each selected ship is provided with all the necessary forms and blank maps on which to chart the daily weather reports from other ships and from the land stations. That is, each ship captain is encouraged to plot the different reports so as to get a definite picture of the weather such as our regular forecasters use in making the daily forecast.

At first, Mr. Brotzman says, some of these experienced seamen were not inclined to go in for this map making aboard ship. The sailorman is a good judge of the weather where he is and modern ocean liners are so big and strong and safe that ship captains have become accustomed to set their course and stick to it, no matter what the weather along the path.

According to Mr. Brotzman, however, most of the mariners are now making the maps, and making them serves the ends of good seamanship.

For instance, there was this case of the two American ships which left England for New York. They were sister ships of similar build and power, and both ably manned. The first ship left Portsmouth two days before the second. The second ship, however, reached New York two days ahead of the other, with a big saving in fuel and operating cost.

The difference was that the second ship used weather maps drawn by its own officers from reports received by radio. It was one of those in the selected ship program.

The first ship running blind as to weather conditions ahead along her route plowed right into a storm and was held back by strong head winds. The second ship from her charted reports knew where the center of the storm was, and went around it. In fact, she actually managed to get tail winds which added to her speed. Of course, it is not often that such a big saving as that can be made, but any saving in time and cost is not being overlooked by the ship captains.

Practically all the trans-Atlantic ships now make maps and Mr. Brotzman finds that after making maps for a while, the ships officers realize the need for accurate reports and take more pains in taking their observations.

These daily ship reports have enabled the forecast division of the Weather Bureau to draw fairly good maps across the Atlantic and have been a big aid in making forecasts for trans-Atlantic ocean flights.

New York is only one of three centers which it is now planned to use in the further development of our share in this international marine weather service. Similar work has recently been started to secure the cooperation of thirty more American boats from among those operating in southern waters from New Orleans, Galveston, Port Arthur and other ports and going to South America and Africa.

Eventually it is hoped to establish another center at San Francisco for boats operating out of that port. And remember this is an international affair. While our Weather Bureau is getting the cooperation of American ships, the other nations are likewise lining up vessels which fly their flags. No matter what the nationality when those boats are in the Western Atlantic they report to Washington, and when boats under our flag pass 35 going east they report to the other side. Each side exchanges reports. And the messages, no matter from what ship, are sent in a number code and re-broadcast in a number code which is the common language of this growing weather service for all the people on the high seas, and the lands that lie beyond. And one of the very important features of the new scheme is the work of visiting ships and keeping in personal contact with the ships officers to insure regular and accurate reports on every trip to sea.

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ANNOUNCEMENT: Your old friend, Ob. Server, will bring us another chat with the weather man two weeks from today. These talks come to you through the cooperation of Station _____ and the United States Department of Agriculture of which the Weather Bureau is a part.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION
AUG 19 1931
U. S. Department of Agriculture

CHATS WITH THE WEATHER MAN

RELEASE Friday, August 21, 1931.

ANNOUNCEMENT: Old Ob. Server is going to give us another of his chats with the weather experts of the United States Weather Bureau.-- Well, Mr. Ob. Server, I guess we've had enough dry and hot --- As far as we are concerned, we'll take ours damp and cool ---- What do you say?

****

Here in the middle of dog days, we generally think of rivers and streams being at their lowest.

But Mr. W. J. Moxom, of the river and flood division of the United States Weather Bureau, tells me that the lowest readings ever recorded on some of our river gauges were in winter -----

That's another pet idea about August gone smash -- gone smash on the ice! It is a cooling thought all right, but I didn't give up without a struggle. I asked him how he figured.

He explained that ice gorges up river from the gauge dammed back the water, and caused the water to reach its lowest recorded level at several places he had in mind, in winter months.

Mr. Moxom knows what he is talking about, because he is the man who you might say, is responsible for measuring the level of our rivers. That is, he looks after the placing, and checking, and repairing of the gauges at our 700 river gauge stations, scattered along the chief river systems of this great country.

Of course, the level of the water in some of those rivers stays pretty low at this season of the year and so it is often a busy season for the men who locate, and place, and repair the measuring devices.

From what Mr. Moxom tells me, it is very important to get the low-down on rivers. For instance, when a hydro-electric survey is being made with a view to using thewater power for electricity, the engineers must know how much water they can count on, and especially must they know the lowest stage and the highest stage of the river.

But that is not Mr. Moxom's chief interest in the low water mark. When his engineers locate a river gauge, they aim to place the zero at low water; the lowest water known or a little below, so there will be no need of bothering with negative or minus figures in making calculations of river levels. Sometimes, in locating a gauge in a new locality, the best available information of where the water comes in the slack water season is not good enough.

For instance, Mr. Moxom was telling me of a gauge on which the zero was found to be far above the lowest low water on that stream during the extreme drought last year. In that case, the gauge had to be relocated, and then the Weather Bureau statisticians had to go back and correct the records to make the readings on the new location comparable with those which had been taken in past years. That is the reason, they use the utmost care in locating gauges accurately in the first place.

You have probably seen some of these river gauges. They are rather simple looking affairs.

One of the best types is the staff gauge, just a sort of big yard-stick, graduated in feet and tenths of a foot, and bolted to some permanent place, such as against the side of a bridge-pier or other solid construction rising out of the water.

At some places on some streams, where the banks are low and sloping and the bridge piers are on the bank away from the water's edge, a sloping gauge is erected to mark the water level. That is, instead of being a straight up-and-down ruler bolted in position, the gauge is a securely fastened timber or other market which runs up the slope of the bank. In that case, of course, the graduations on the sloping marker are so spaced as to mark the vertical rise of the water, just as does the straight up-and-down staff gauge.

The third type of gage is a chain and weight affair which works from a box attached to railing of bridge, or sometimes the bridge floor. The chain has a copper marker in one of the links accurately placed a certain distance from end of weight. The measuring scale is usually attached to bridge railing, extending from one end of box. The level of the water is determined by lowering the weight through an opening in box until the weight end just touches the surface of water; the gage reading being the point on scale where the marker in chain indicates. In that kind of gage the chain and weight are kept locked in the box and gage readings can only be made by the observer. The chain gauge, Mr. Moxom says is a very accurate gauge permitting the ready reading of differences as small as a hundredth of a foot. However, the pull of the weight on the chain tends to stretch it, so that frequent checking is necessary with that type. Each link in the chain will in the course of a few months, be distorted a very minute amount, but the sum total of the distortion may result in the gauge being two or three tenths of a foot, off if not checked and corrected at frequent intervals.

The ease with which the more simple types of gauge may be read by rivermen and the general public make them the favored kind for most localities.

But even the location of a simple staff gauge is not so simple as it may seem. If the gauge is torn out, by ice or drift wood, or any other way, it is highly important that it be replaced exactly the same level as before.

To make that possible, bench marks or reference points must be established entirely separate from the bridge or other place to which the gauge is affixed. You have probably seen such marks, sometimes in the form of copper bolts, or brass plates, or maybe just a cross cut in the concrete on a street curb or on the foundation of a public building. They are placed at a certain height with reference to the zero point on the river gauge. To relocate a gauge exactly, the surveyor runs his line from that fixed point.

The purpose of all this accuracy, of course, is to enable the forcaster in the district Weather Bureau center to predict the stage of the river, and especially to issue warnings in case of danger of floods.

The river and flood service is organized with its principal headquarters at the central office of the Weather Bureau in Washington, but it maintains about 66 district centers outside of Washington River-gauge and rainfall stations report to the district centers by telegraph and telephone giving the amount of rainfall and reading of the river gauge. At each river-gauge station there is also usually a rain-gauge to measure the rainfall. There are also a large number of rainfall stations scattered throughout the watersheds of the various rivers. With the reports of the height of the water at points up-stream and reports of rainfall over the watershed, the forecasters are often able to make astonishingly accurate forecasts as to just how high the river will rise at down stream points. To do that, of course, the forecasters must take into consideration not only the river stages and rainfall, but the amount of water in the soil and temperature and seasonal conditions which affect the run-off.

Of course, the forecasters of river conditions sometimes go wrong, as do meterologists dealing with other phases of our highly-complicated, suddenly changing weather. Mr. Moxom mentioned that on the Illinois River, flood forecasts have been made within one-tenth of a foot of the actual stage a week in advance. And at New Orleans, similar accuracy has been attained 30 days in advance. Just think of it, predicting within two or three inches of the exact height the water would reach a full month ahead.

And think too, when you hear the warnings of floods flashed out by radio, and telephone, and telegraph, and of the lives and property rescued by means of the timely warnings, that back of this sensational service are the patient daily measurements by observers at a thousand river and rainfall stations, and back of those measurements is the constant work of checking, and repairing, and locating the gauges to secure the highest accuracy.

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ANNOUNCEMENT: Thanks, Mr. Ob. Server, for the low-down on high water. This chat with the weather man comes to us from the United States Weather Bureau through the cooperation of Station _____ with the United States Department of Agriculture.

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UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

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CHATS WITH THE WEATHER MAN

Friday, September 4, 1931

NOT FOR PUBLICATION

ANNOUNCEMENT: No matter what the day, nor where the place, the weather is important. Our old friend, Ob Server, has been talking with scientists of the United States Weather Bureau again. This time it is about another of the many services of the Bureau ----- But I'm going to let him tell you about that ----- Well, Mr. Ob. Server.

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As Mr. W. W. Reed, of the climatological division of the United States Weather Bureau, reminds me, our Weather Bureau didn't spring into being over night.

Its far-flung net-work of stations, tied together by wire and radio, and systematically reporting to central headquarters, is a gradual development.

In its present form, it is just about forty years old. Before that it was part of the U. S. Army. It came into being as a branch of the Signal Corps. Our first regular weather stations were at military posts about sixty years ago. Before that scientists of the Smithsonian Institution were doing some investigating of the weather. And before any government or semi-governmental organization took hold, individuals were watching and recording weather conditions. Ben Franklin and Tom Jefferson were among our early independent weather observers.

And, Mr. Reed says, that is the way it has been in other countries. First interested individuals, scattered here, there and yonder, begin keeping weather records. Then comes closer organization, and finally systematized observation under the direction of a central office and a network of stations.

Mr. Reed has recently completed a compilation of climatic records for South America. And from what he tells me, it seems that in that vast continent to the South of us are to be found weather services in nearly all stages of development.

In southern South America, Argentina, Chili, and Uruguay each have had central institutions with a network of stations collecting weather reports for many years. There are not many big regions which do not have weather stations.

In northern South America, in Dutch and British Guiana, Venezuela and Brazil, there are also networks of stations under central offices, which have been developed to such an extent they can give a fairly comprehensive view of the prevailing weather conditions over their various parts.

In other countries, Mr. Reed says, there has been little or no coordination of efforts to determine climatic conditions. Vast areas are still almost entirely unexplored. However, there are many stations in the west of the Andes Mountains at which weather records have been kept for rather long series of years. Those stations are irregularly distributed over the territory. They are located at various places from sea level to 15,000 feet above sea level. From the records of those stations it is possible to make a fairly accurate estimate of the temperature for any place in that territory, when you know its elevation.

But suppose one of our "good-will" aviators wants to get the needed weather information for a flight through South America. How is he going to know what kind of weather he is likely to find in the different countries along his route? Of course, you say, he can apply to the weather services of those countries. Yes, but you must remember that there are a number of different countries involved. And you must also remember that some of them have not yet developed as complete services as others. Some of the information might have to come from independent, scattered station records published here, there, and everywhere. Obviously, the air pilot would be able to gain only a patchwork of information; even if he had the months, or even years, of time he would need to hunt down the scattered records.

That is not an altogether fanciful case, either. Mr. Reed mentioned that the U. S. Weather Bureau has been actually called upon for weather records for use on just such a flight.

Then there are those pioneer souls who see the opportunities of a new country beckoning to them from certain parts of South America. They often want to know whether the climate where they propose to settle will fit in with their plans. They call upon the Weather Bureau for the answer.

More often, however, it is the practical business man and shipper in this country who needs to know about the climate. The rainfall at certain times of the year may determine how he will pack his goods, or when he will ship, or whether it will pay him to ship at all. Where is the answer?

Well, that is one of the things Mr. Reed is working on. He is gathering together the temperature and rainfall records from all parts of South America. He is working out the averages for each month of the year.

That's evidently quite a job. Sometimes just one little line of figures giving the mean monthly and annual temperature for one station means adding up the records of twenty years and hours of calculation.

Fortunately, he doesn't have to include Brazil in his compilation, because there are already comprehensive records of the climate of that country written in Portuguese. As it is mostly a matter of figures, our weather men don't even have to know how to read Portuguese to get the accurate picture of the climate from those records.

On first thought, you might think it would be easy to just figure South American climate from what we know of North American climate. You would naturally expect that the weather in December at a place a certain distance below the equator would be about the same as it is in June at a place an equal distance above the equator.

But then there is the question of elevation. Weather comes in three dimensions, you might say. For instance, on the northern border of Argentina, due to the influence of the Andes mountains, there is a change in the average year-round temperature from east to west of 22 degrees in the short distance of 100 miles.

In the interior of temperate South America you might expect to find much the same climate we have in the interior of our country, until you realize that the southern part of South America slopes more to a point. It is narrower, and there is not the room to develop the continental type of climate we have in the middle of our country.

On the northern coast of Chili, with winds from the ocean, moisture in the air, and clouds overhead, you would naturally look for rain. Yet that is one of the most outstanding regions for lack of rainfall on the face of the earth. That, Mr. Reed explains, is largely traceable to effect of cool ocean currents which wash those shores, and to the fact that winds from the other side of the continent drop their rain in trying to climb the steeps of the Andes mountains.

You see this matter of climate is complicated. Really to know your weather for any place takes regular records taken near the spot. And to have those records, on hand for our business and other interests to use means collecting the figures from many sources and days and months of work arranging them in convenient tables, so "he who runs may read." That is what the U. S. Weather Bureau is doing with the records from governments, and institutions, and independent observers throughout all South America.

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ANNOUNCEMENT: Just another of these services of the United States Weather Bureau. This time the work was outlined to your old friend, Ob, Server by Mr. W. W. Reed, of the Bureau's climatological division. We will have another chat with the weather man two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

Radio Service

OFFICE OF INFORMATION
SEP 8 1931
U. S. Department of Agriculture

CHATS WITH THE WEATHER MAN.

Friday, Sept. 18, 1931

NOT FOR PUBLICATION

ANNOUNCEMENT: This is our time to chat with the weather man. Our old friend Ob. Server, is here. He has evidently been to the United States Weather Bureau again. He seems to be all filled up with weather lore. -- What is it this time, Mr. Ob. Server? ----- What's on your mind? -----

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I've just found out that, as a rule, our long-distance, cross-the-oceans aviators spend considerable time at the library of the United States Weather Bureau. They study over the daily weather maps prepared in this and other countries they expect to fly over. For instance, flyers headed East across the North Atlantic like to get hold of the maps prepared in Germany and Denmark. Those and other from all the civilized countries of the world are there in our Weather Bureau library.

And the librarian tells me he is now looking for one of those ancient brick tablets of Babylon, known to contain weather proverbs of some three or four thousand years ago written in those queer cuneiform characters baked in the clay.

From the bricks of Babylon to the latest airplane flight; that gives you some idea of the range of weather information in the field of the U. S. Weather Bureau Library. In fact, that library is the world's greatest collection of modern weather science books, periodicals, and daily weather records. On weather, it outranks the Library of Congress and other great libraries of the world.

One of the problems of the librarian is to find space for the big volumes of bound copies of the daily weather maps published in all civilized countries and which must be ready for use at any time.

You see, while some of us can just take the weather as she comes, but for those with business affected by the weather, the Weather Bureau library is a veritable treasure-trove.

It was used extensively during the World War for looking up climatic information about many parts of Europe in order to properly plan military operations, make proper provision in the way of clothing for soldiers, and the like.

It is used from day to day by those going abroad, and by merchants

shipping goods to foreign countries. Merchants want to know whether shipments susceptible to certain types of climatic damage will encounter that kind of weather before they reach their destination. --- But come into the library with me. I want you to meet Mr. Talman. Mr. C. F. Talman is the librarian of the U. S. Weather Bureau. He has charge of this strongest meteorological collection in the world. Incidentally, the two hundred small branch libraries located at the two hundred Weather Bureau Stations scattered throughout the country are also under his direction. And in his spare time, he is compiling an encyclopedic weather dictionary, of more than fifteen thousand weather terms, including slang, dialect, and scientific names for weather phenomena. He calls that dictionary his life hobby and says he collect weather terms as some other people collect postage stamps.

He figures that it may be some years before that unique dictionary is finished, but in the meantime each of the definitions collected is filed on a card and the collection is in daily use as a ready reference to strange weather terms which crop up in the work of the weather scientists.

Of course, one of the chief uses of the Weather Bureau library is for purely scientific purposes. The very heart of the collection is the part of the library devoted to the science of meteorology proper. It is not only used by the scientists of the U. S. Weather Bureau itself and other scientists who come to the Bureau for information, but it lends scientific books to proper accredited scientific people all over the country.

About one-third of the whole collection of books in the Weather Bureau library are bound volumes of scientific periodicals including publications in English, French, German, Italian, Dutch, Russian, Magyar, Japanese and other tongues.

Another department of the library has some ten thousand books giving descriptions and statistics of climate in all parts of the world. For instance, the Weather Bureau of India, where rainfall is often a matter of life and death to the people, issues each year a bound volume of rainfall data that is as big as an unabridged dictionary and weighs nearly twelve pounds. One of his haunting nightmares, Mr. Talman says, is what that file of volumes will be like in the year 5000. Germany, also has a great deal of weather, and leaves none of it unrecorded. The British are lavish publishers of weather statistics. The Russian weather experts are now trying to make up for lost time, with the publication of weather statistics for their vast territory.

Weather as a science, however, is comparatively young. As an organized science it extends only to about the middle of the nineteenth century. But when you realize that for years there have been more than thrity thousand observers in different parts of the world making observations two or three times a day, the volume of statistics already accumulated is tremendous.

But the collections of books on the weather at the U. S. Weather Bureau goes back far beyond the time of telegraphic weather reports and systematic measurement. It goes back beyond that first attempt at the collection of weather data through the cooperation of several observers in Italy in 1654.

Mr. Talman showed me a treatise on the weather published by old Albertus Magnus in 1494. That was just a paraphrase of the first scientific treatise on the weather written by the Greek philosopher, Aristotle more than three hundred years before the Christian era.

He also showed me a weather journal of the Rev. Wm. Merle in which were recorded the weather conditions in his locality in England day by day from 1337 to 1344. The first weather records kept in America as far as is known were also kept by a minister, the Rev. Johan Campanius. He kept a weather record day by day in the little Swedish colony of New Sweden near the present site of Wilmington, Delaware, for the years 1644 and 1645.

At that time, meteorological instruments were in their earliest infancy. There were no instruments used and no accurate measurements recorded. They were just everyday observations of the general condition of the weather at that place. Old books such as those journals may throw some light on whether or not there have been any changes in our climate, but for the most part they are merely of antiquarian interest.

Mr. Talman says, however, that some of the meteorological libraries abroad surpass our U. S. Weather Bureau library in the matter of antiquities, but very few of them. As far as modern works on the weather are concerned, the library of the U. S. Weather Bureau, with its nearly fifty thousand volumes, is without doubt the largest and strongest meteorological collection in the world. Whether it is old or new, if it concerns the weather in any of its many and varied ramifications from prehistoric weather legends to the latest effort at long range forecasting it has a place in our great reservoir of weather information at Washington.

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ANNOUNCEMENT: Our old friend, Ob. Server seems to have enjoyed his visit to the greatest weather library in the world. It is certainly good to know where to find the facts. --- This time two weeks from today, with the cooperation of the United States Department of Agriculture, Station _____ will present another of these chats with the weather man.

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CHAT WITH THE WEATHER MAN RELEASE Friday, October 2, 1931

FOR BROADCAST PURPOSES ONLY

ANNOUNCEMENT: Our old friend, Ob Server, has again been talking with specialists of the United States Weather Bureau and again brings us one of those chats with the weather man. His story today is not all wet, but there is plenty of water in it, at that--- All right, Mr. Ob. Server our umbrellas are up!----------

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You have heard the old saying "It never rains but it pours."

I guess all of us, at one time or another, have been caught out in one of those storms in which the rain seemed to come down by the bucket full. In fact, some of my friends claim they have seen it come down in wash-tubs; but then some folks are inclined to exaggerate.

I've just been talking with Mr. J. B. Kincer, chief of the division of agricultural meteorology, of the United States Weather Bureau, and he has been giving me the low down on our big downpours.

He tells me that Altapass, North Carolina, held the United States record for biggest rainfall in 24 hours for a number of years. That record was made July 15 and 16, 1916, when over 22 inches of rain fell. That was quite a bit of water, but Taylor, Texas, drowned that record in its rain of September 9 and 10, 1921, when two unusually violent thunderstorms brought down 23.22 inches of rain, according to the official gauge. That is the all-time heavy rain record for these United States. In that one day's time, seven times as much rain fell as the normal amount for the entire month of September at that station.

In fact, in many places near-by during that record rain, it is estimated that more than 30 inches of rain fell in fifteen hours. For hours the streets of Taylor, Texas rain 1 to 4 feet deep in water. That was quite a rain!

Mr. Kincer also tells me that there have been some unusual rains in Florida. At Quincy, Florida, on September 15, 1924, 12.9 inches of rain fell in one day, and in August 1915 there was a rain of 15.4 inches one day, which was pretty good for a place where the average rain for the whole month of August amounts to about 7.0 inches.

And speaking of rain coming down by the tub full, we have seen several hard showers in our time. Of course, we can't beat that rainfall at Porto Bello, Panama, in 1911, where there was more than 2 1/2 inches of rain in five minutes. Seven inches of rain fell in half an hour, and people caught out in it had to hold their hands over their faces to get air.

But that was considerable of a shower in southern Michigan when 3.34 inches of rain fell in less than an hour.

In fact, Mr. Kincer says there is no place we don't have some rain at some time. Even the Sahara Desert and Death Valley have light rains; and every now and then a hard shower.

And that reminds me of a story he told of a western real-estate agent and a prospective buyer from the east. The agent was showing the easterner over a big tract of arid land. He waxed eloquent about farming prospects on that land, but the prospective buyer expressed doubt of there being enough moisture for his purposes.

"I know you easterners think that way," countered the agent, but right here we had thirty inches of rainfall last year."---To cinch the argument, he turned to his driver and said "Isn't that so, Bill?

"It sure is," Bill drawled, "I was out here myself the night that rain fell." -------

Anyway, Mr. Kincer says, that sometimes they do have some torrential rains in the so-called dry country. And in our western plains States, the hardest rains most frequently come at night.

Some parts of the country, however, are much less liable to have excessive rainfall. Ohio, for instance, is a region where there are few intense rains, but even there the country was soaked in over 6 1/2 inches of rain in one day.

When the floodgates of heaven open up and the rain comes suddenly pouring out in sheets, and in buckets, and by the washtub we used to call it a "cloud-burst."

Of course, there is nothing about a cloud to "burst." But the meteorologists do say that rain sometimes comes down harder, faster and more intensely than it can actually be formed.

What happens in such "cloud-bursts" Mr. Kincer says, is that the rain is formed and falling, but strong upward currents of air support it from below, prevent it from reaching the earth, and so it accumulates in larger quantities than the ordinary sized rain drops. When the uprush of air slackens or the accumulation of water becomes too great for its prop of air to support, we have one of those deluges, which seem so much like the bottom dropping out of the bathtub.

You've probably noticed that the raindrops in a sudden thundershower are generally much bigger than those in a slow rain. They had to be bigger and heavier to get down against the strong rising current of air, which helps produce the thundershower.

As Mr. Kincer explains, raindrops are formed when warm moist air is cooled. A cubic foot of air at zero will hold only 1/2 grain of water vapor. Warm that air up to 60 degrees and it will hold 5 1/2 grains of that invisible water vapor. Heat that air to 80 degrees and it will hold 11 grains of water vapor per cubic foot.

Such hot air rising cools off. The cooler air can no longer hold the load of water vapor with which it started, so part is condensed out in the form of visible droplets which continue to grow until they get big enough to fall to earth as rain drops.

What we call "dampness", however, is not simply a question of how much water there is in the air, since warm air may hold more moisture than cold air and yet feel dry. In fact, even in a desert, with its scorching heat, the air may actually contain more moisture than at a place which appears to us as very damp.

But getting back to our rainfall, we certainly have a lot of variety in the amount of rain in different parts of this country; from 120 inches a year in the Olympic Mountains of Washington, down to less than 5 inches a year in southeastern California.

In fact, there are some striking differences, Mr. Kincer points out, in the Pacific Northwest. While the annual rainfall is 120 inches in western Washington, a little east of there it drops to 25 to 30 inches. Then in the Cascade Mountains, it rises to 80 inches, while still further east in the Columbia Valley it is less than 10 inches, while still further east in the mountains of Idaho it is 40 inches.

You will notice that it is in the mountains that the heavy rainfall occurs. This is because the warm moist air is forced upward in crossing the mountains. Cooled in its upward climb, it can no longer hold as much moisture, so part of that water vapor is condensed out as rain which falls on the mountain side.

That is hardly doing justice to Mr. Kincer's description, but at least that is the rough general idea.

Anyway, you get the main idea, rainfall comes principally as a result of warm, moist air rising. That is one thing that makes it so hard for the weather forecaster to make accurate rain forecasts. The weather charts from which he makes his forecast are made up from reports from all over this country and other countries. Those charts give him rather full information about the horizontal movements of the surface air, but less information about local vertical currents that may be produced and cause a shower here and there.

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ANNOUNCEMENT: Those "bucket fulls of rain" remind me of that old rhyme. "The rain came down in torrents,---I never shall forget--The train pulled into the station, and the bell was ringing wet."---Old Ob. Server will be back with us two weeks from today with another chat with the weather man.

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CHATS WITH THE WEATHER MAN — RELEASE Friday, October 16, 1931.

FOR BROADCAST PURPOSES ONLY

ANNOUNCEMENT: And now for a chat with the weather man. Again our old Ob. Server brings us a few observations from the weather-wise of the United States Weather Bureau ----------Well, Mr. Ob.Server what is it this time?

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Well, I guess all you radio listeners realize that weather sometimes has a lot to do with radio. A thunderstorm sometimes breaks in on a delightful program, in a most disconcerting way.

But, what is surprising to me, is the number of folks who seem to have picked up the notion that broadcasting has something to do with the weather.--Yes, sir! They actually have tried to settle the blame for the recent drought on the effect of radio stations on the air. And, as if that wasn't going far enough, those who have been soaked with too much rain have also blamed radio. They have written the United States Weather Bureau about it.

I say it is a surprise to me, but it doesn't seem to surprise Dr. W.J. Humphreys, chief of the Bureau's Division of Meterological Physics. He says similar complaints were made about telegraph lines and their effect on the weather. Various unusual weather conditions were also blamed on the railroads, back in the days when railroads seemed something new and marvelous. In fact, Dr. Humphreys says, it seems to be human nature to explain whatever is not understood by attributing it to something that is still more mysterious. What is more natural then, for people who know little of either weather science or radio, to try to explain that unusual drought as in some way connected with the seeming marvels of radio.

Of course most of them are very vague as to just how broadcasting could effect the weather. They just make a wild guess that it does. Others however, try to bolster up the notion with some show of scientific knowledge; but they get terribly mixed-up in the process.

For instance, some of these muddled guessers have suggested that radio broadcasting burns up the water vapor in the air and so decreases the amount of rainfall. In support of that notion, they point to the well-known laboratory experiments in which water is broken up into its constituent parts, hydrogen and oxygen, by passing an electric current through it.

That sounds very pretty, Dr. Humphreys says. The trouble is that in radio broadcasting nothing remotely similar to that happens. In broadcasting, it is radio waves and not electric currents which are sent through the air. And even if it were electric current, the combined power of the stations in all parts of the country would not take enough water out of the air to water a small potato patch.

But Dr. Humphreys is not content to ridicule these outlandish notions about radio and weather. He has made a special study of popular weather lore of all countries and all times. Good or bad, he puts weather legends and proverbs to the acid test of scientific knowledge and reasoning. On that basis, he declares that we know from theory, and observation, and experiment, that no element of the weather is affected by radio. Here is his line of reasoning:

He analyzes Nature's own way of making rain. That, he says, is the best way to see just how and to what extent radio could affect rainfall.

In the first place, Dr. Humphreys points out, the first action necessary to precipitation, whether as rainfall, or snowfall, hail, or sleet, is evaporation. That is, the water first has to be gotten into the air in the gaseous form, before it can come out again in the form of rain or other precipitation.

Well, the rate of evaporation, as you know, depends chiefly on four things. First, on the temperature of the evaporating water. Second, on the area of the evaporating surface. Third, on the velocity of the wind, and Fourth, on the dryness of the air.

Of course, no one in the neighborhood of a powerful "sending station" ever claims that any lake, or reservoir, or other body of water nearby spreads over a lot more ground when the station is in operation than it does when the station is silent. So I guess we will all agree that in as far as the rate of evaporation depends on the area of the evaporating surface, radio certainly has nothing to do with it; so we can just pass up that second factor.

And the first also, for that matter. You know the temperature of the water does not vary appreciably, if at all, with the wireless activity. Neither, so far as any one can observe, does the wind round about a wireless station change with the amount of broadcasting or receiving. And you will realize that radio does not alter the dryness of the air, either.

All right, then. If radio does not affect any of the things that themselves make for evaporation, it doesn't affect evaporation itself. So it has nothing to do with getting the moisture into the air.

I seem to hear some of the very folks who have had this notion about the radio affecting the weather- say! "Well who said it did?"

That brings us to the next step in Nature's rain-making, as outlined by Dr. Humphreys; the condensing of the water vapor out of the air in the form of drops. That is where some folks claim radio comes in.

To make rain drops, two things are needed. First, you must have something for the drops to form on. Dr. Humphreys tells me that each cloud droplet has as its nucleus and excessively small particle of some substance that readily takes up water vapor.

When the white-capped waves on the vasty ocean break or are thrown into spray, little particles of sea salt are projected into the air. Air currents may carry them thousands of feet into the air. Salt taking up water readily, those minute particles of salt in the air make first rate nuclei on which cloud droplets can form and grow by adding water until they fall as raindrops.

Some land dusts, such as fine pollen grains from plants and flowers, or bits of decayed vegetation, or soot, serve the same purpose. And you might think that since there is more soot about cities, and soot takes up water so readily that more rain would be formed about cities. However, Dr. Humphreys says there is always, everywhere, plenty of the needed dust particles for rain formation. In fact, there is a superabundance. Adding more to the air has no effect. It is like the proverbial carrying of coals to Newcastle.

By direct experiment, Dr. Humphreys says, it has been demonstrated that the nuclei needed for rain drop formation are not produced by wireless waves.

But to get raindrops you need something besides particles about which the water can collect. To get water vapor condensed takes adequately cooling of the vapor and with it (unavoidably) the other elements in the atmosphere. Yet it has been found that the temperature of the air does not go down about an active wireless station any faster, nor to a lower degree, than it does at other similarly located places.

Evidently then, radio does not take water vapor out of the air and make it drier, thus increasing evaporation and subsequent rainfall. Neither does it prevent or decrease rainfall since it has no effect on any of the factors of either evaporation or condensation.

On top of that, Dr. Humphreys says, drought may prevail in one region at the same time that another, with equal wireless facilities, is being flooded. Furthermore, such droughts, and floods as we now have prevailed time and again throughout the world long before radio was ever dreamed of.

No. Some radio programs may make you glad, and others may make you weep, but the sending out of radio waves from a broadcasting station has nothing to do with Nature's weeping or the withholding of her tears.

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ANNOUNCEMENT: Our thanks to Dr. W.J. Humphreys, of the United States Weather Bureau, for knocking another nut notion on the head. Radio has enough troubles of its own, without anybody trying to blame it for the weather. This time two weeks from today we will have another of these chats with the weather man.

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UNITED STATES DEPARTMENT OF AGRICULTURE
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CHATS WITH THE WEATHER MAN. RELEASE Friday, October 30, 1931

FOR BROADCAST PURPOSES ONLY

ANNOUNCEMENT: Speaking of weather, our old friend Ob. Server is going to do just that. He has been nosing around among the weather records with specialists of the United States Weather Bureau --- but he will tell you about that ---- Well, Mr. Ob. Server? ---

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Where is the coldest spot in the United States? ----

No, you're wrong. It wasn't in your bed room this morning ---

What is the hottest place in the country? Where is the rainiest? Where does the snowfall lie deepest? Where does the wind blow strongest? The poet speaks of the winds that blow and are never weary, "but where really are they the steadiest?

I asked Mr. Herbert C. Hunter of the climatological division of the United States Weather Bureau these and other questions, and he gave me the official records. I was surprised at some of those records too. I know some of my friends will be when I cite them.

You know about this time of the year, I find a lot of people suddenly getting an unusual interest in the weather. I guess it is the change of seasons. Anyway, they begin to look both ways toward bad weather. Some like it cold, and some like it hot. Some look back on the summer. Some think of the winter ahead and past winters. Some cuss the fall rains, and others are still talking about the drought. And some of those people are always claiming that where they were the weather was the worst.

When anybody gets to talking about dry weather, some traveler insists on mentioning Greenland Ranch, in Death Valley. For ten years, they had an average rainfall of little over an inch and a half of rain per year, at that station in Death Valley. That is our United States record dry spot.

Yet that seems sopping wet compared to that place down in Chili, Arica, where Mr. Hunter tells me, in seventeen years there was a total rainfall of one-third of an inch. There was an average of only 2 hundredths of an inch a year. Just think of it, seventeen years and only one-third of an inch of rain all put together during that time! Why, a child down there might grow almost to manhood without ever having seen a rain.

Compare that with the place in India, Cherrapunji, northeast of Calcutta, where records kept for over sixty years show an average of 457 inches

of rainfall a year. That is about 38 feet of rainfall a year. You'll have to admit that is a lot of rain for any one place.

The nearest to that we can come in this country is at Glenora, Oregon, where the annual rainfall averages 131 inches, or about 11 feet of rain. But even in the eastern part of this country we have some wet spots. The record rainiest station in the East is in Macon County, in the mountains of North Carolina, where the average yearly rainfall amounts to a little over 7 feet.

Now that we are getting along to the season when the snows begin to fly, maybe some of us think in terms of snowfall. For deep snows, we turn to the mountains. And of course snowfall records are not so easy to get. However, the Sierra Mountains in California seem to be the where the snowfall is the thickest. One station in California shows 38 feet of snow a year, and another about 36 feet. The Cascade mountains of Oregon and Washington have annual snows which are not quite that deep.

Just what is the biggest single snowstorm it is hard to tell, Mr. Hunter says, because when it gets started snowing in some of our western states, it just seems to get the habit and keep on snowing more or less continuously. In Rainier National Park 200 inches of snow fell, in the course of three weeks during which it snowed every day practically all day.

In the East we have considerable snow. The record in the East is held by a station on the west side of the Adirondack Mountains in New York where 141 inches of snow are recorded as the yearly average.

Maybe most of you would have guessed where the snowiest and rainiest and driest spots in the country are, but I am wondering how many of you can tell off hand where it is windiest. And where the wind has blown the hardest, fastest on record. Nautrally, you think of some of those West Indian hurricanes which sometimes sweep up into our country.

And you will be getting into real wind-guage smashing winds when you check up on those hurricanes. If you take in the Porto Rico records, that hurricane on September 13, 1928, which recorded a wind-velocity of 160 miles an hour before the wind gauge was blown away, beats anything we can show in the continental United States. At Miami Beach in the hurrican of 1926, a wind of 123 miles an hour velocity was recorded for five minutes. Cape Lookout, North Carolina, in another hurricane registered 125 miles. But the strongest wind on record in the United States proper was not along our southern coast, but at Mount Washington, New Hampshire, where a wind of 140 miles an hour was registered.

Mount Washington also leads the country in the average speed of the wind the year around. The average at that station is 33 miles an hour. The winds which blow around the top of Pike's Peak in Colorado average only 20 1/2 miles an hour on the annual basis.

Wind records are sometimes deceptive. Few people realize, Mr. Hunter says, how hard it is to get accurate measurements of the wind's velocity.

It is difficult to get instruments which will exactly keep step with the wind. That is, to get an instrument which will move three times as fast, when the wind blows three times as strong, for instance.

But let's look into some other weather records. Let's risk another shiver or two, and look in the cold weather record. The coldest it has been anywhere in this country, proper, is 65 degrees below zero near Miles City, Montana, back in January, 1888. But that was an unusually cold year in that section, the record that month was 25 degrees below normal, or rather below the mean temperature for that region at that time of the year. When these Weather Bureau men speak of the mean temperature, they mean the average; but for anybody who don't like cold weather, I guess you would call that real mean weather.

Of course, in the interior of our territory of Alaska the thermometer registers even lower than that. It has been down to 76 degrees below in Alaska. The world's lowest, however, was over in northeastern Siberia, where it got 90 degrees below.

If the mere thought of any such cold makes you extra chilly, just think for a moment about that temperature at Greenland Ranch, in Death Valley on July 10, 1913, when the thermometer registered 134 degrees above, in the shade. But even an ordinary daytime summer temperature in Death Valley of 115 is not exactly cold.

Yet paradoxical as it may seem, the average annual temperature at Greenland Ranch, which by the way used to be called Furnace Creek Ranch, is lower, cooler if you will, than the average annual temperature at Key West, Florida, which lays some claim to a salubrious climate.

Of course, the average in Death Valley is reduced by the night temperatures which fall as low as 40 degrees in winter.

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ANNOUNCEMENT: We will have another chat with the weather man two weeks from today. These talks come to you through Station ---- in cooperation with the United States Department of Agriculture.

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CHATS WITH THE WEATHER MAN

RELEASE Friday, November 13, 1931

FOR BROADCAST PURPOSES ONLY

ANNOUNCEMENT: Now for our Chat with the Weather Man. Our old friend, Ob Server, has again been with the specialists of the United States Weather Bureau and again brings us word of recent developments behind the simple, matter-of-fact daily weather forecast which we read in the papers and hear by radio ----- And speaking of adventure --- But we'll let him tell you ------ Well, Mr. Ob. Server?

******

Yes, there are thrills back of our weather forecast.

You know, the weather forecaster reaches beyond the clouds for some of the information on which he bases those daily weather predictions.

Of course, he has done that to some extent for years by means of recording instruments sent into the upper air attached to kites.

Recently, air-plane flights have been substituted for kite-flying, and it seems that some of the pilots who man the planes are daring weather adventurers, climbing to dizzy heights to get the daily record of conditions there.

In fact, Mr. L. T. Samuels of the aerological division of the United States Weather Bureau, tells me that the results of this new work have exceeded expectations. The pilots have gone much higher than expected. There have been few delayed flights on account of rough weather, in spite of the dangers.

There are four of these Airplane Weather Stations; one at Dallas, Texas; one at Omaha, Nebraska; one at Chicago, Illinois; and one at Cleveland, Ohio. Three kite stations were closed, when these new airplane stations were opened last July.

Each morning at about 5 o'clock Eastern Standard Time, pilots at these four airplane stations start on their daily weather recording trips which ordinarily take about an hour and a half to complete.

The planes are equipped with automatic instruments for recording the temperature, the relative humidity, and the barometric pressure. And each pilot also notes the time he enters and leaves clouds and notes any rain or snow aloft which does not reach the ground on account of warmer dry air nearer the surface. That latter information, Mr. Samuels says, is of great value to forecasters in determining the prospects for rain.

These weather planes rise slowly, at not more than three to five hundred feet a minute, so as not to throw off the weather recording instruments, which lag in making the record if the plane goes up too fast. The record coming down is not used, so the plane swoops down in 10 or 15 minutes from a climb that has taken more than an hour.

The use of planes gives the forecasters the upper-air information much earlier than it can be obtained by the use of kites. It takes three to four hours to send up the kites. That is, it takes about twice as long to get upper-air records by kite as by plane, and what is even more important for the weather scientists, the planes have been reaching double the altitude reached by the kites.

During August at the Dallas Airplane observation station the planes recorded air conditions up to 21,424 feet, while at Omaha in September, the pilot pushed his plane to 23,031 feet. Compare that with the Ellendale, North Dakota, Kite Station where the kites only reached an altitude of 10,500 feet, Mr. Samuels says, and you get some idea of the advantages of using airplanes.

This airplane observation work of the Weather Bureau is done on contract, the contracts being let to the lowest and best bidder at the several points selected as stations. The first contracts were awarded on the supposition that the average height reached would be about 13,500 feet, and 10 per cent extra was offered for each additional 1500 feet as an incentive for pilots to get records at higher levels, while a deduction was to be made for each 1500 feet short of 13,500 feet. If a pilot goes up less than 1500 feet he gets nothing at all.

So far, the pilots have averaged far above the expected 13,500 feet and earned much more by taking the added risks in the higher altitudes; for there are risks to this work.

I suppose you heard about that Cleveland pilot who ran into a huge thunderhead last August. He was on his daily weather recording climb, when he headed into that big mass of clouds 2500 feet thick, flying so the plane was practically level. Then things began to happen fast and furiously. Rising air currents within those clouds seized the plane. It shot up 1400 feet a minute on an extremely rough ride. The plane was completely out of immediate control. Then suddenly the plane reached the top of the thunderhead. It stopped its dizzy upward rush so quickly the pilot was almost thrown out of his seat. In fact, his parachute catching on the edge of the cockpit seems to have been all that saved him. His experience in that cloud, he thinks, may give some clue to many unexplained air accidents.

But the possibility of such adventures is not the only risk which may greet the pilots in the apparently serene upper air. The icing of planes flying in clouds has taken place during some of the hottest weather this past summer.

Of course, you know when planes fly into clouds or rain below the freezing point, the sub-cooled droplets congeal on the plane to form a coating of ice. We ordinarily think of the danger from that ice being the added weight. But Mr. Samuels tells me that the weight is not the most serious effect. There is even more danger in the mal-formation of the wing by the

accumulation of ice so as to effect the smooth flow of air over the wing. That is, the ice may practically change the design of the wing. Ice accumulating on the guy wires also makes them vibrate tremendously and may cause them to break, while ice on the propellor may throw it out of balance, and result in literally tearing the motor to pieces.

In spite of these risks, however, the pilots have made a wonderful record. Naturally, during the coming winter the difficulties may be greater, and the high average of daily high flights may be lowered.

However, each of these contract weather planes is required to be equipped with radio, and is in constant radio communication with the station below. In that way, the pilots keep informed of conditions on the ground, and if there is fog on the field, they can land elsewhere if necessary. Information of cloud height when the ceiling is low is especially important for pilots working near big cities where there is danger of running into high buildings or other obstructions.

Those records brought down by the airplane pilots are immediately worked up and telegraphed to the district forecast centers at Washington, Chicago, Denver and New Orleans, where they are received in time for the regular morning forecast, wired out to the various stations within the different districts.

In addition to their use in making the regular forecasts and the forecasts for use along our airways, these records are sent to the centers for computation and to be used in working out average conditions at the various elevations.

They are also valuable in special studies made relative to certain types of weather conditions, such as the distribution of those highs and lows which form so prominent a part of our daily weather maps. As Mr. Samuels says, we are always trying to find what we can of conditions in the upper air, not only because we are traveling through the air nowdays, but because conditions at the higher levels give us valuable clues as to what may happen in the way of weather here below.

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ANNOUNCEMENT: You have just heard the Chat with the Weather Man, presented by this Station _____ in cooperation with the United States Department of Agriculture. These chats, giving the most recent developments in weather science as gathered at the United States Weather Bureau, come to you every other Friday.

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CHATS WITH THE WEATHER MAN

Friday, November 27, 1931

NOT FOR PUBLICATION

ANNOUNCEMENT: Every other Friday, old Ob. Server tells us something new about the weather and the weather men. He has inside information. He has talked with the weather-wise men of the U. S. Weather Bureau. He knows what they are doing to help the rest of us take advantage of the best weather and dodge the effects of the worst weather.---All right, Ob Server, what's new now?

- - - - - -

About this time of the year, when I begin to drop casual remarks about the shipping forecasts, some fellow, who is not a shipper, speaks up and wants to know, "What are shipping forecasts?"

Weather Bureau stations have been making shipping forecasts for twenty years or more now. They never attracted much attention until the World War and the big move to conserve all foodstuffs. The big shippers and railroads began to make more regular use of them then.

Nowadays, Mr. Montcose W. Hayes of the U. S. Weather Bureau tells me, there is no perishable produce shipped by rail from the big shipping centers except on shippers' forecasts. Mr. Hayes is in charge of the River and Flood Division of the Weather Bureau, but for years he was at the St. Louis station, where among other things, he had much to do with the development of weather forecast service to shippers there.

The Weather Bureau issues shipping forecasts during the winter in all parts of the United States when the temperature is expected to be freezing or lower. These forecasts show the temperatures which may be encountered by freight trains within the next twenty-four hours. They are made to cover the distance an ordinary freight train will travel in twenty-four hours.

They read something like this: "Protect shipments northbound against temperatures of zero to twenty below, eastbound ten to fifteen, south between fifteen to twenty, and west zero to ten below."

The forecasters use the same regular daily weather map, made up from observations taken all over the country, which they use in making the ordinary weather forecasts with which we are all familiar. In making the shipping forecasts, however, shippers are warned against temperatures a little lower than those expected to show on the thermometers at the Weather Bureau stations. That is because freight trains moving along valleys and standing in exposed open country, are apt to meet colder air than that at the regular weather stations.

Every thing we eat of a perishable nature which moves in winter is protected by these forecasts, which form one of the most important services of the U. S. Weather Bureau in winter time.

Of course, they are of the biggest benefit and are issued to a greater extent in regions where there is a fluctuation in temperature from well above to considerably below freezing.

As shipping by ordinary freight car is cheaper than in insulated or by heated cars, shippers want to know when they can ship by ordinary freight car. Railroads, on the other hand, will not accept shipments of perishables for ordinary freight cars if a temperature below a certain limit they have set is forecast.

At the forecasting station several men are often kept busy answering calls for the forecast from shippers and railroads. The short, pithy predictions of temperatures to the north, east, south, and west are soon given. The forecasts are wired out each morning over ordinary commercial lines at the regular rates, and the railroads and shippers pay the toll.

But these forecasts often enable them to make big savings. By preventing heavy and sudden losses, they have a tendency to keep produce prices more even.

It is easy to see the value of such information in the case of apples and oranges and other fruits and vegetables. Also for shipments of mineral waters, and inks, and mucilages, But Mr. Hayes tells me that one of the big uses of these forecasts is in shipping iron ore, and gravel, and sand.

Folks who have never had any experience with such shipments in cold weather might think that sort of queer. Not long ago, however, a company loaded some open cars with sand and gravel when the lowest temperature was 48 degrees. Then they got a shipping forecast of a thirty degree drop. Instead of letting the shipment go ahead, they ordered the cars dumped and waited for warmer weather. The sand and gravel go in the cars wet. It might freeze solid in the cars and not only tie up the material for several weeks but also tie up the cars all that time. Either that, or make necessary the expense of thawing it out by steam.

The same is true of shipments of iron and other ores. So you see, not alone perishable produce is protected by these forecasts. Then there are the coal dealers. Naturally, they want to know when it is going to be cold. Retail coal dealers are often largely guided in placing orders with the mines, and wholesalers and brokers by Weather Bureau forecasts. And, of course, many florists make use of weather information in shipping flowers.

Shipping forecasts are most in demand in November, and early December. All winter in most of the big shipping centers, however, there will be thousands of calls for this special forecast service which has been developed by the Weather Bureau. And, of course, the other end of the thermometer is of interest to summer shippers of perishables.

To ship or not ship in refrigerator cars? To ice or not to ice the cars? are very practical money questions with some kinds of produce in the summer. Shippers and railroads often read the answer from these shipping forecasts which now are rated as one of the most valuable of the many valuable services performed by the United States Weather Bureau.

ANNOUNCEMENT: Our Ob. Server will again chat with Station___'s audience two weeks from today. We have had weather for a long time now. But it is such a changeable subject, the U. S. Weather Bureau men seem to be kept pretty busy keeping ahead of the changes. - - - - - -

UNITED STATES DEPARTMENT OF AGRICULTURE
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CHATS WITH THE WEATHER MAN Friday, December 11, 1931.

ANNOUNCEMENT: No matter what the day, nor where the place, the weather is important. Our old friend, Ob Server, has been talking with scientists of the United States Weather Bureau again. This time it is about another of the many services of the Bureau -----But I'm going to let him tell you about that---Well, Mr. Ob. Server.

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As Mr. W. W. Reed, of the climatological division of the United States Weather Bureau, reminds me, our Weather Bureau didn't spring into being over night.

Its far-flung net-work of stations, tied together by wire and radio, and systematically reporting to central headquarters, is a gradual development.

In its present form, it is just about forty years old. Before that it was part of the U. S. Army. It came into being as a branch of the Signal Corps. Our first regular weather stations were at military posts about sixty years ago. Before that scientists of the Smithsonian Institution were doing some investigating of the weather. And before any government or semi-governmental organization took hold, individuals were watching and recording weather conditions. Ben Franklin and Tom Jefferson were among our early independent weather observers.

And, Mr. Reed says, that is the way it has been in other countries. First interested individuals, scattered here, there and yonder, begin keeping weather records. Then comes closer organization, and finally systematized observation under the direction of a central office and a network of stations.

Mr. Reed has compiled climatic records for South America, And from what he tells me, it seems that in that vast continent to the South of us are to be found weather services in nearly all stages of development.

In southern South America, Argentina, Chili, and Uruguay each have had central institutions with a network of stations collecting weather reports for many years. There are not many big regions which do not have weather stations.

In northern South America, in Dutch and British Guiana, Venezuela and Brazil, there are also networks of stations under central offices, which have been developed to such an extent they can give a fairly comprehensive view of the prevailing weather conditions over their various parts.

In other countries, Mr. Reed says, there has been little coordination of efforts to determine climatic conditions. Vast areas are still almost entirely unexplored. However, there are many stations in and west of the Andes

Mountains at which weather records have been kept for rather long series of years. Those stations are irregularly distributed over the territory. They are located at various places from sea level to 15,000 feet above sea level. From the records of those stations it is possible to make a fairly accurate estimate of the temperature for any place in that territory, when you know its elevation.

But suppose one of our "good-will" aviators wants to get the needed weather information for a flight through South America. How is he going to know what kind of weather he is likely to find in the different countries along his route? Of course, you say, he can apply to the weather services of these countries. Yes, but you must remember that there are a number of different countries involved. And you must also remember that some of them have not yet developed as complete services as others. Some of the information might have to come from independent, scattered station records published here, there, and everywhere. Obviously, the air pilot would be able to gain only a patchwork of information; even if he had the months, or even years, of time he would need to hunt down the scattered records.

That is not an altogether fanciful case, either. Mr. Reed mentioned that the U. S. Weather Bureau has been actually called upon for weather records for use on just such a flight.

Then there are those pioneer souls who see the opportunities of a new country beckoning to them from certain parts of South America. They often want to know whether the climate where they propose to settle will fit in with their plans. They call upon the Weather Bureau for the answer.

More often, however, it is the practical business man and shipper in this country who needs to know about the climate. The rainfall at certain times of the year may determine how he will pack his goods, or when he will ship, or whether it will pay him to ship at all. Where is the answer?

Well, that is one of the things Mr. Reed is working on. He is gathering together the temperature and rainfall records from all parts of South America. He is working out the averages for each month of the year.

That's evidently quite a job. Sometimes just one little line of figures giving the mean monthly and annual temperature for one station, means adding up the records of twenty years and hours of calculation.

Fortunately, he doesn't have to include Brazil in his compilation, because there are already comprehensive records of the climate of that country written in Portuguese. As it is mostly a matter of figures, our weather men don't even have to know how to read Portuguese to get the accurate picture of the climate from those records.

On first thought, you might think it would be easy to just figure South American climate from what we know of North American climate. You would naturally expect that the weather in December at a place a certain distance below the equator would be about the same it is in June at a place an equal distance above the equator.

But then there is the question of elevation. Weather comes in three dimensions, you might say. For instance, on the northern border of Argentina, due to the influence of the Andes mountains, there is a change in the average

year-round temperature from East to west of 22 degrees in the short distance of 100 miles.

In the interior of temperate South America you might expect to find much the same climate we have in the interior of our country, until you realize that the southern part of South America slopes more to a point. It is narrower, and there is not the room to develop the continental type of climate we have in the middle of our country.

On the northern coast of Chili, with winds from the Ocean, moisture in the air, and clouds overhead, you would naturally look for rain. Yet that is one of the most outstanding regions for lack of rainfall on the face of the earth. That, Mr. Reed explains, is largely traceable to effect of cool ocean currents which wash those shores, and to the fact that winds from the other side of the continent drop their rain in trying to climb the steeps of the Andes mountains.

You see this matter of climate is complicated. To really know your weather for any place you have to possess regular records taken near the spot. And to have those records, on hand for our business and other interests to use means collecting the figures from many sources and days and months of work arranging them in convenient tables, so "he who runs may read." That is what the U. S. Weather Bureau is doing with the records from governments, and institutions, and independent observers throughout all South America.

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ANNOUNCEMENT: Just another of these services of the United States Weather Bureau. This time the work was outlined to your old friend, Ob. Server by Mr. W. W. Reed, of the Bureau's climatological division. We will have another chat with the weather man two weeks from today.

UNITED STATES DEPARTMENT OF AGRICULTURE

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CHATS WITH THE WEATHER MAN.

Friday, Dec. 25, 1931

ANNOUNCEMENT: Now let's hear from our old friend, Ob. Server. He has been chatting again with some of those meteorologists of the United States Weather Bureau. While Christmas bells ring out across the snow, lets listen to our Weather Man.

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Well, folks, Mr. S. Claus, is not the only one who risks his neck climbing over snow-clad steeps for our sake. I've just been hearing about how some of the information about snowfall is brought to us.

Forest rangers and other hardy cooperative observers will soon dare the perils of the mountains, and head out on snow-shoes to check up on the snowfall.

It takes nerve and stamina to go into the high mountains of our West in the dead of winter as some of those men will go. Storms and snow-hidden crevasses, and icy-edged cliffs are a few of the dangers they will face.

Yet, Mr. Montrose W. Hayes, chief of the river and flood division of the United States Weather Bureau, tells me, that every year they do it. Beginning about the first of January, the Weather Bureau sends them out equipped with snow-measuring apparatus. They go over the snow fields and check up on the extent of the fields, and the depth and condition of the snowfall in the mountains where the snow will hang on well into or through the greater part of next summer.

There is good reason for all the risks they run.

You know, snow is just water in another form.

Irrigation projects in the West and the water supplies of many western cities and towns, Mr. Hayes says, are in a large measure dependent on the amount of snowfall. To know how much water will be available for use in mining operations, for power dams, and irrigation reservoirs, it is necessary to know considerable about the amount and condition of the snowfall. The very life of great stretches of our western country is fed by the melting snows from the Rocky Mountains and Coast Ranges.

The hardy snow-shoe scouts, experienced in mountain travel, measure the depth of the snow by means of stakes previously fastened to trees or set in the ground.

To determine the condition of the snow, they carry snow samplers and light spring balances. As Mr. Hayes describes it, the snow sampler is usually a long

tube about two and a half inches in diameter with a scale marked on the outside of it. The observer pushes this tube down into the bed of snow, the depth it goes into the snow being measured by means of the scale on the outside the tube. Then he pulls the tube out full of snow up to the depth it was pushed in.

The object is to find how much water there is in the snow. The more icy the consistency of the snow, the greater the amount of water in it and the longer the snow will last. The tube is weighed on the balance the observer carries with him. The tube is a standardized instrument. Knowing the weight of the snow, it is a simple matter to determine the number of inches of water to which that weight corresponds.

If the snowfall has been light and not wind-packed or sunpacked, it goes off in a hurry. That means a shortage of water shortly after the summer starts. On the other hand, if the snowfall is heavy and well packed by the wind, and then softened by the sun, and frozen again, it forms an icy mass which will last a greater part of the summer.

The reports of the observers are collected in the various district offices of the Weather Bureau. There they are charted and forecasts of the summer supply of water are made for the various streams heading in the mountains.

This snow survey, Mr. Hayes tells me, is difficult and hazardous work, but it is very necessary, and is considered one of the most valuable undertakings of the United States Weather Bureau.

The men who make the survey usually work on a cooperative basis. Most of them are forest rangers.

The survey covers only the Rocky Mountains and Coast Range, as snowfall in our eastern mountains is not so big nor is it the tremendously important factor in the water supply it is in the West.

However, in the Eastern half of the country, the ice in our rivers and harbors is often of considerable importance. Mr. Hayes tells me the Weather Bureau makes measurements of the thickness of the ice and keeps a close check on the movement of ice in rivers.

That is not a matter of settling local bets as to how thick the ice was this year compared to last. Its chief importance is in determining what may be expected when the spring break-up occurs.

After a severe winter, early spring floods are especially disastrous at times on account of the jamming of ice which dams the streams.

Mr. Hayes points out that, the Mississippi and Ohio, might be clear of ice and shipping in progress, but immense quantities of ice be jammed up stream. The Weather Bureau watches such ice gorges closely. Sun and rain loosen the gorge and great flows of ice are likely to sweep down stream and cause big damage to barges, packets, and all other forms of river craft.

At the Weather Bureau sub-stations, the river gage reader keeps a record of the ice formed, and its condition, and telegraphs or telephones that informa-

tion to the district office.

The Weather Bureau station keeps men on duty all night, and special watchmen are held on duty continuously just to watch the ice gorges when weather conditions indicate a break is imminent.

Pittsburgh is the city most often interested in ice conditions, for ice often does considerable damage at Pittsburgh. However, during the winter of 1917-18, Mr. Hayes says, there was more ice in the Mississippi river than during any other winter on record. The river was full of ice from Memphis to its source, and river packets and barges were sunk by ice at Memphis. Some of the ice went south of Vicksburg, Mississippi.

But we are getting a little ahead of our weather. We started out to talk about the snowfall survey, which is the basis for the practical long-range forecast of summer water supplies in the West. Here's to those hardy snow-shoe adventurers in search of weather facts! And may they have a safe and successful climb over the snow fields!

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ANNOUNCEMENT: That's another of those services of the United States Weather Bureau. Old Ob. Server will be back two weeks from today to give us the results of another of his chats with the weather man. These chats are presented by Station _____ in cooperation with the United States Department of Agriculture.

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